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PROJECT SPECIFIC PLAN FOR AREA 3A/4A SURFACE PREDESIGN INVESTIGATION

SOIL CHARACTERIZATION AND EXCAVATION PROJECT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

INFORMATION ONLY

JUNE 1999

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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FERNALD ENVIRONMENTAL MONITORING PROJECT

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ASL	analytical support level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
D&D	Decontamination and Dismantlement
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
FACTS	Fernald Analytical Computerized Tracking System
FRL	Final Remediation Level
GPS	Global Positioning System
HPGe	high-purity germanium
HWMU	hazardous waste management unit
ICP/MS	Inductively Coupled Plasma/Mass Spectrometry
mg/kg	milligram per kilogram
mL	milliliter
NaI	sodium iodide
OSDF	On-Site Disposal Facility
ppm	parts per million
PSP	Project Specific Plan
QA	Quality Assurance
RMS	Radiation Measurement System
RSS	Radiation Scanning System
RTRAK	Real Time Radiation Tracking System
RWP	Radiological Work Permit
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SVOC	semi-volatile organic compound
TAL	Target Analyte List
μg/kg	micrograms per kilogram
UST	underground storage tank
V/FCN	Variance/Field Change Notice
WAC	waste acceptance criteria
WAO	Waste Acceptance Organization

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1.0 INTRODUCTION

1.1 PURPOSE

This project specific plan (PSP) has been developed to investigate the exposed ground surface in Remediation Areas 3A and 4A. Area 3A/4A comprises the eastern half of the Former Production Area, and is bounded generally by First Street to the south, the Former Production Area boundary fences to the east and north and B Street to the west (Figure 1-1). This PSP covers the following activities:

- perform a real-time scan of all accessible exposed ground surface to identify areas that potentially exceed the total uranium waste acceptance criteria (WAC) for the On-Site Disposal Facility (OSDF); confirm and delineate any identified above-WAC total uranium areas, as applicable

- collect physical samples to bound areas of known contamination (other than total uranium) that exceed the OSDF WAC

- collect total uranium physical samples in areas identified by the three-dimensional computer model as having a high uncertainty of surface uranium concentration; physical samples will only be collected in areas that are not accessible for real-time scanning (i.e., under concrete slabs)

- establish 1983 state planar coordinates for the original areas of one hazardous waste management unit (HWMU) and two underground storage tanks (USTs) within Area 3A/4A that will require attaining final remediation level (FRL) following excavation.

The data collected in this investigation will be used to delineate above-WAC surface areas and to establish the footprint of HWMUs and USTs. This information will be used in the remedial design for Area 3A/4A to identify the volume of above-WAC material and to specify the soil areas that will be excavated first. The results will also be used to identify areas needing further study during the Area 3A/4A subsurface predesign characterization investigation, which will be performed later this year.

1.2 BACKGROUND

As shown on Figure 1-2, Area 3A/4A includes many of the site's largest facilities. The Boiler Plant, Maintenance Building, Plant 9, Building 64 (Thorium Warehouse), and Building 65 (Plant 5 Warehouse) are located in Area 3A. At this time, decontamination and dismantlement (D&D) has been completed on the Boiler Plant and Plant 9 and is currently underway on the Maintenance Building. Buildings 64 and 65 are scheduled for D&D in 2000. Area 4A includes Plants 4 and 7, which have already undergone D&D, and Plants 5 and 6, which will undergo D&D beginning in 1999 and 2000, respectively. The surface of Area 3A/4A is suspected to have become contaminated through airborne deposition, spills, leaks, and contact with contaminated equipment and debris.

1.3 CONSTITUENTS ABOVE THE OSDF WAC

A search of the Sitewide Environmental Database (SED) was performed to identify constituents present in the exposed surface soil (0 to 1 foot depth) of Area 3A/4A at concentrations that meet or exceed the OSDF WAC. The following three constituents were identified:

- total uranium
- 4-nitroaniline
- bis(2-chloroisopropyl)ether

The results associated with these constituents are presented in Appendix A. Figure 1-2 illustrates the locations of the above-WAC hits of these constituents. Real-time scanning will be performed in accessible areas to bound the above-WAC uranium contamination, and physical sampling will be performed to bound the above-WAC 4-nitroaniline and bis(2-chloroisopropyl)ether contamination.

The WAC for 4-nitroaniline is 44.2 micrograms per kilogram (μg/kg) and the WAC for bis(2-chloroisopropyl)ether is 24.4 μg/kg. Because current analytical methods are unable to achieve reliable detection levels at the WAC for these two constituents, the current U.S. Environmental Protection Agency (EPA) contract laboratory program contract required detection limits of 830 μg/kg for 4-nitroaniline and 330 μg/kg for bis(2-chloroisopropyl)ether will be used as the WAC attainment values when evaluating data collected under this PSP. This approach is consistent with the WAC Attainment Plan for the OSDF, which requires that analytical limitations for bis(2-isochloropropyl)ether and 4-nitroaniline be addressed in the individual PSPs. Under optimum samples and laboratory conditions, results lower than the contract required detection limits may occasionally be reported and qualified as estimated during data validation (such as those presented in Appendix A). Any results below the contract required detection limits will be considered to be below WAC.

1.4 SCOPE

Under this PSP, real-time and physical sampling will be performed on Area 3A/4A to identify and bound soil with contaminant concentrations above the OSDF WAC. Following review of sample results, additional samples may be collected beyond those identified in this PSP if the extent of above-WAC material has not been adequately bounded. In this situation, a variance to this PSP will be written. Sampling activities carried out under this PSP will be performed in accordance with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), the Sitewide Excavation Plan (SEP), the WAC Attainment Plan for the OSDF, and Data Quality Objectives (DQO) SL-048, Rev. 5 and DQO SL-055, Rev. 0 (see Appendix B for both DQOs).

1.5 KEY PROJECT PERSONNEL

The key project personnel are listed in Table 1-1.

TABLE 1-1
KEY PERSONNEL

Title	Primary	Alternate
DOE Contact	Rob Janke	Kathi Nickel
Production Area Project Manager	Rich Abitz	Jyh-Dong Chiou
Production Area Characterization Lead	Christine Messerly	Rich Abitz
Real-Time Field Lead	Brenda McDaniel	Dave Allen
Field Sampling Lead	Mike Frank	Tom Buhrlage
Surveying Lead	Jim Schwing	Jim Capannari
WAO Contact	Linda Barlow	Christa Walls
FEMP Sample Management Office Contact	Bill Westerman	Grace Ruesink
Data Management Lead	Christine Messerly	Rich Abitz
Data Validation Contact	Jim Chambers	Jim Cross
Quality Assurance Contact	Reinhard Friske	Ervin O'Bryan
Health and Safety Contact	Debbie Grant	Lewis Wiedeman

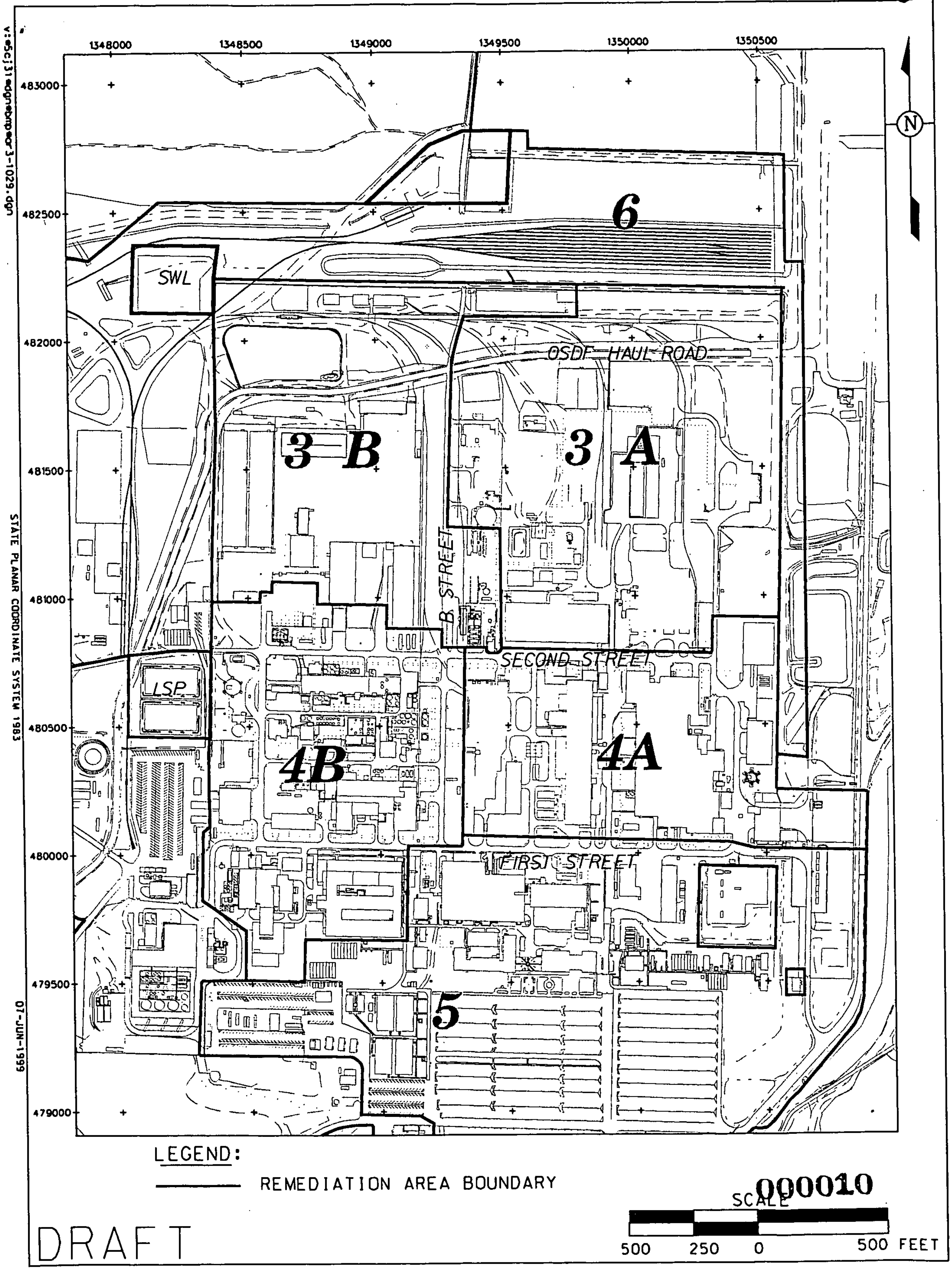
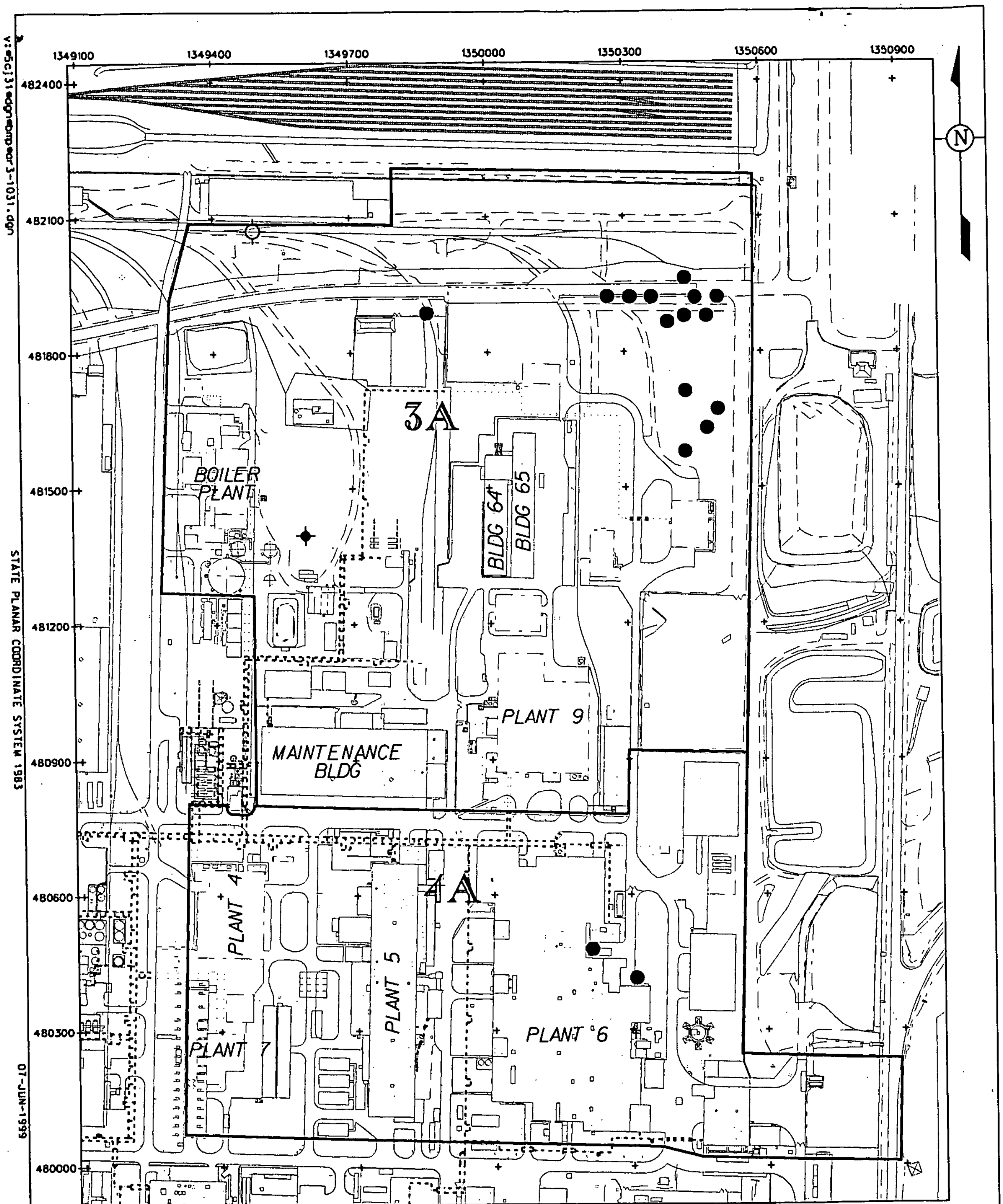


FIGURE 1-1. LOCATION OF AREAS 3A/4A



LEGEND:

REMEDIATION AREA BOUNDARY

4-NITROANILINE

BIS(2-CHLOROISOPROPYL)ETHER

TOTAL URANIUM

SCALE

300 150 0 300 FEET

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FIGURE 1-2. SURFACE ABOVE-WAC LOCATIONS IN AREA 3A/4A

2.0 PHYSICAL SAMPLING STRATEGY

2.1 SELECTION OF SAMPLE LOCATIONS

Physical sampling will be performed to bound above-WAC locations of 4-nitroaniline and bis(2-chloroisopropyl)ether at two locations. The presence of these constituents at concentrations above the OSDF WAC (as defined in Section 1.3) will be confirmed and bounded using biased sample locations and standard laboratory analytical methods. At each location, one sample (0-0.5 feet) will be collected as close as possible to the original sampling point. Samples will then be collected from 0-0.5 feet deep in the four cardinal directions, approximately 3 feet away from the original sample location. If the presence of above-WAC contamination is confirmed at the surface, a variance to this PSP will be written to vertically bound the above-WAC area.

A three-dimensional computer model of uranium contamination in the Former Production Area identified several areas where there is a high uncertainty in the total uranium concentration. Most of the areas are accessible by real-time scanning; however, there is an area south of the Maintenance Building that is covered in concrete and is not accessible for real-time scanning. Three total uranium samples will be collected beneath the concrete south of the Maintenance Building in order to reduce the uranium concentration uncertainty in that area. The locations of these samples are based on accessibility by the Geoprobe®. Due to the time involved in drilling through the concrete, archive samples will be collected at the same time from each location from the 1-1.5 foot, 2-2.5 foot, and 3-3.5 foot intervals.

Figures 2-1 through 2-3 show the sample locations, and Appendix C summarizes all samples to be collected and analyzed.

2.2 SAMPLE COLLECTION METHODS

Samples will be collected using the Geoprobe®, hand auger, or direct-push liner in accordance with procedure SMPL-01, *Solids Sampling*. The field team will determine which method will be used at each location. If refusal or resistance is encountered during sample collection, the location may be moved within a 1-foot radius of the identified sample location. If the distance is greater than one foot from the originally-planned sample point, the change must be documented on a Variance/Field Change Notice (V/FCN) form, as described in Section 5.4.

The 4-nitroaniline and bis(2-chloroisopropyl)ether samples will be collected using the Geoprobe, direct-push liner sampling, or hand augering. For Geoprobe and direct-push liner sampling, the liner containing the soil core will be laid out on clean plastic, and the appropriate sample interval, as identified in Appendix C, will be separated from the core. Following hand augering, a 6-inch sample interval will be placed into a clean tray so that the soil can be carefully transferred to clean sample containers. The 4-nitroaniline and bis(2-chloroisopropyl)ether samples must be stored at a temperature of 2°-6°C.

The total uranium samples will be collected using the Geoprobe. The liner containing the soil cores will be laid out on clean plastic, and the appropriate sample interval, as identified in Appendix C, will be separated from the core. Total uranium samples do not have to be cooled.

At all sampling locations, the surface vegetation within a 6-inch radius of the sample point will be removed using a stainless steel trowel or by hand with clean nitrile gloves while taking care to minimize the removal of any soil. Samples will be screened with a beta/gamma (Geiger-Mueller) survey meter and a photoionization detector (PID). The screening results will be recorded on the Field Activity Log. Any debris (e.g., wood, concrete, metal) contained in a sample interval will be removed from the sample prior to placement in the sample container. Each sample container will be filled with soil representative of the entire 6-inch interval. If gravel or asphalt/concrete is present at the surface, the 0-0.5 foot sample will be considered the top 6 inches of soil with less than 50 percent gravel. Sampling and analytical requirements are list in Table 2-1. Disposition of excess soil and decontamination water will be determined by the Field Sampling Lead and the Waste Acceptance Organization (WAO) Excavation Project Lead.

Unique customer sample numbers and Fernald Analytical Computerized Tracking System (FACTS) identification numbers will be assigned to all samples collected. The sample labels will be completed with the appropriate sample collection information.

The field technicians will complete a Field Activity Log, Sample Collection Log, and Chain of Custody/Request for Analysis forms. All of these forms are to be completed in the field prior to submittal of the samples to the Sample Processing Laboratory.

The total uranium samples will be sent to the on-site laboratory for analysis. The semi-volatile organic compound (SVOC) samples will be sent to the Sample Processing Laboratory, where they will be prepared for shipment to an approved off-site laboratory in accordance with procedure 34-10-501, *Shipping Samples to Off-Site Laboratories*. One alpha/beta screening sample will be collected and analyzed on site for each SVOC location. The laboratories will analyze the samples for the appropriate Target Analyte List (TAL), as identified in Appendix D.

2.3 SAMPLE IDENTIFICATION

All physical soil samples collected for laboratory analysis will be assigned a unique sample identifier, as listed in Appendix C. This identifier will consist of a prefix designating the area name and sampling event (3A4A), followed by the sample point number (1 through 10), a depth identification (1=0-0.5 feet, 2=0.5-1.0 feet, etc.), and a letter designating the type of sample ("R" for total uranium, "S" for SVOC, "AB" for alpha/beta screening, and "V" for archive). "AB" will be added to denote alpha/beta screening samples. For example:

> 3A4A-9-1-AB is the sample collected in Area 3A/4A from the 0-0.5-foot interval at sample point 9 and is an alpha/beta screening sample.

2.4 EQUIPMENT DECONTAMINATION

Decontamination is performed to protect worker health and safety and to prevent the introduction of contaminants from sampling equipment to subsequent soil samples. Sample equipment will be decontaminated before transport to the sampling site. Additionally, equipment that comes into contact with sample media must undergo Level II decontamination as specified in SMPL-01, *Solids Sampling*.

2.5 BOREHOLE ABANDONMENT

Each total uranium borehole will be plugged using bentonite pellets or a bentonite grout slurry immediately after sampling is completed and a Borehole Abandonment Log will be completed. Any concrete or asphalt that is removed will be replaced with an equal thickness of cement. Surface sample boreholes (6 inches deep) will be collapsed and do not require a Borehole Abandonment Log.

TABLE 2-1
SAMPLING AND ANALYTICAL REQUIREMENTS

Analyte	Sample Matrix	Lab	ASL	Preserve	Holding Time	Container	Sample Mass
Total SVOCs (TAL A and B)	Solid	Off-site	B	Cool to 2°-6°C	14 days	120-mL widemouth glass with Teflon-lined lid	90g
Total Uranium (TAL C)	Solid	On-site	B	None	12 months	250-mL widemouth glass	40g
Alpha/Beta Screen	Solid	On-site	B	None	None	Any container	10g

Notes: The alpha/beta screen is only required for samples destined for off-site laboratories.
Off-site samples will be recorded on a separate Chain of Custody form from the on-site samples.

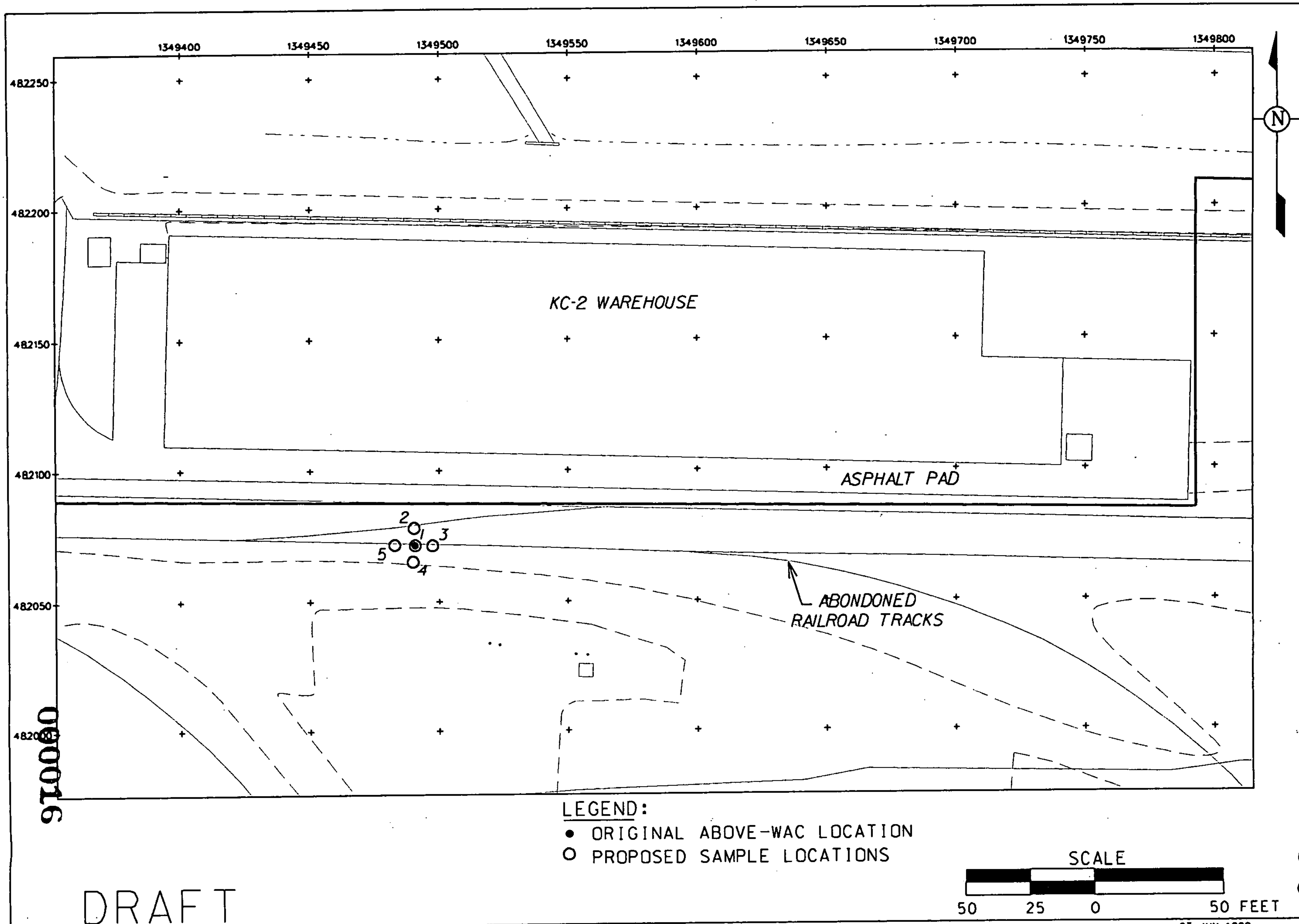

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FIGURE 2-1. 4-NITROANILINE SAMPLE LOCATIONS

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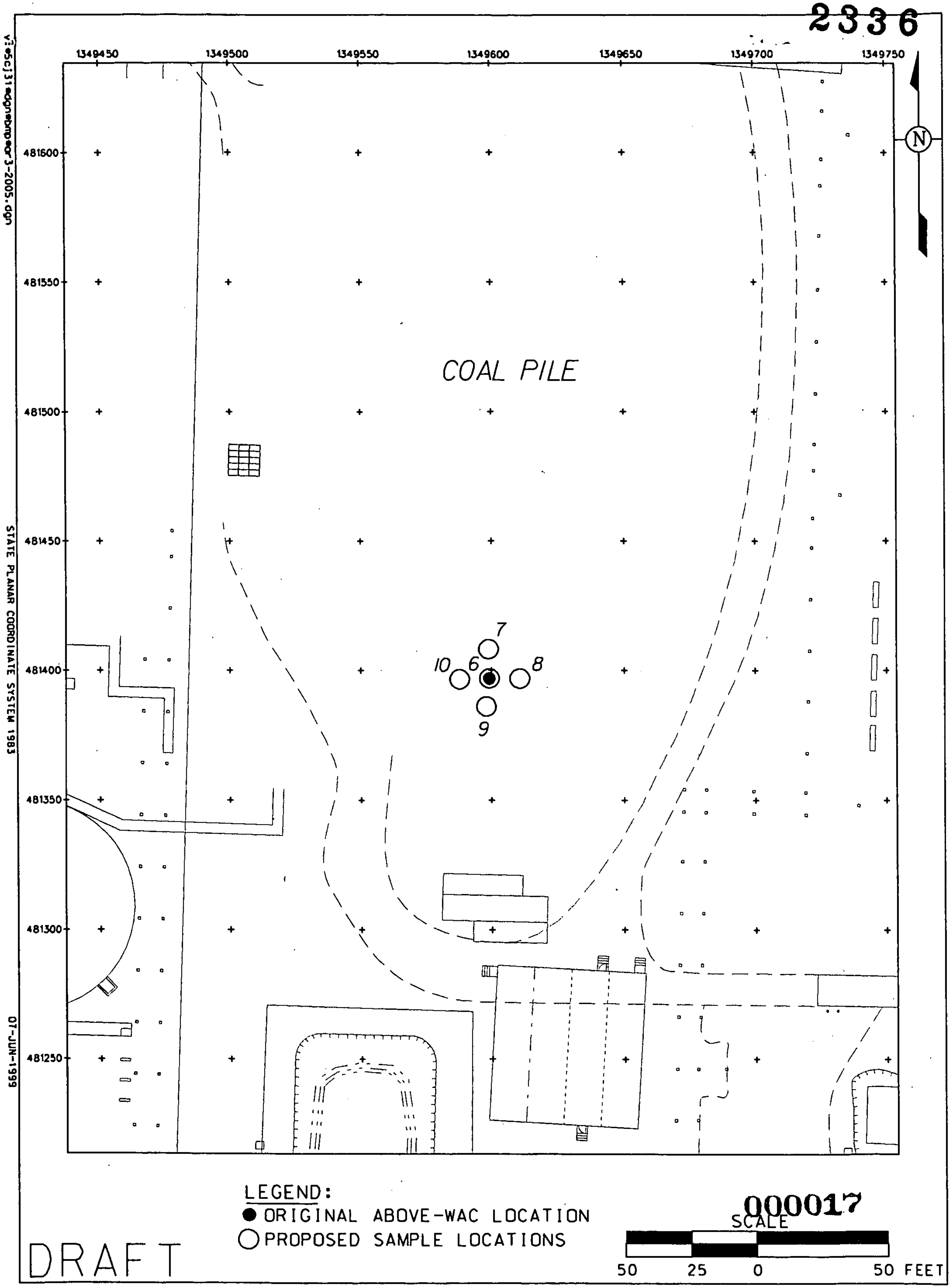

FIGURE 2-2. BIS(2-CHLOROISOPROPYL)ETHER SAMPLE LOCATIONS

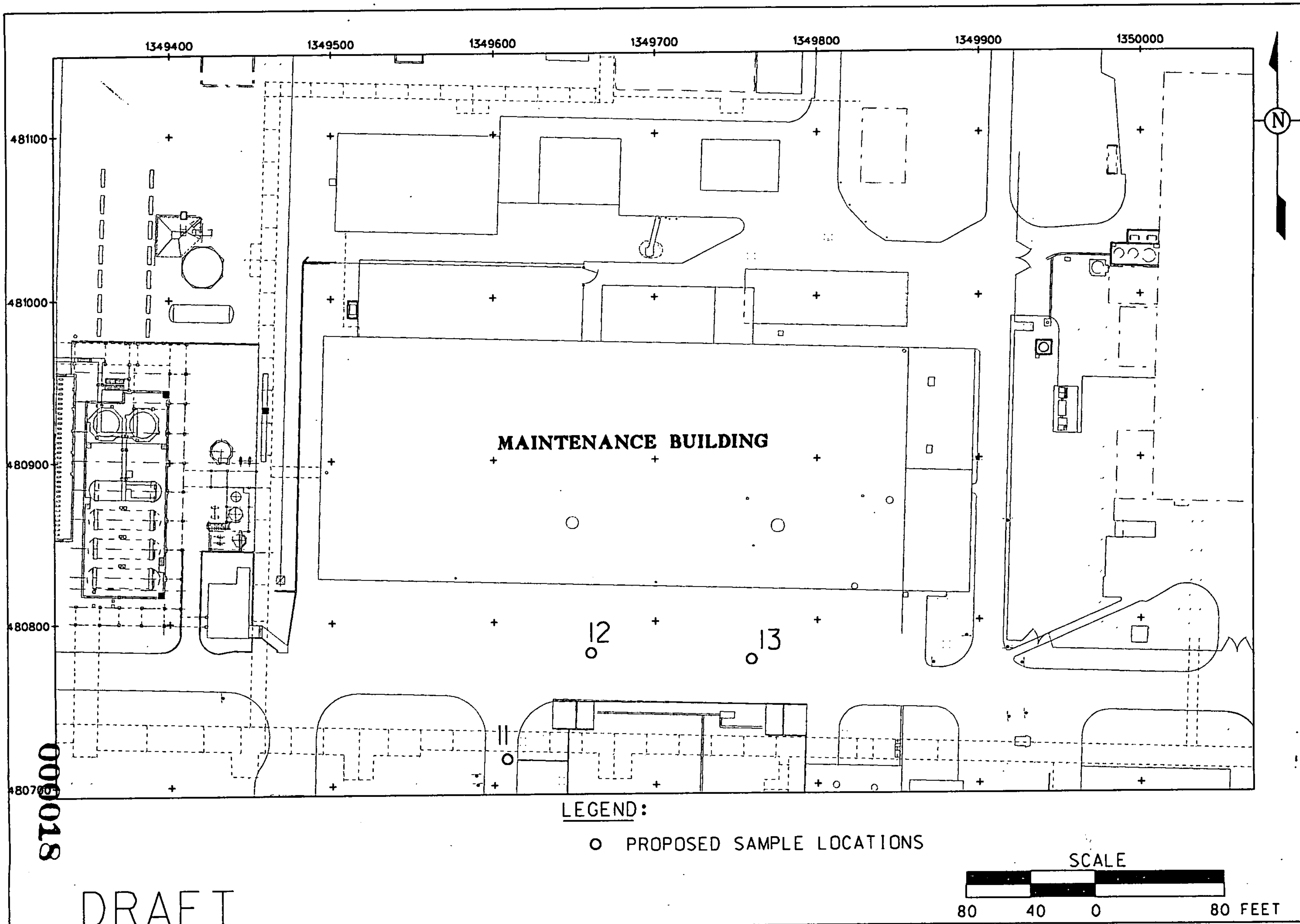

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FIGURE 2-3. TOTAL URANIUM SAMPLE LOCATIONS

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3.0 REAL-TIME RADIOLOGICAL SCANNING

The real-time total uranium WAC investigation of the topographic surface in Area 3A/4A will be performed to cover as much exposed soil and gravel as possible using either a high-purity germanium (HPGe) portable detector or a mobile sodium iodide (NaI) detector referred to as the Radiation Measurement System (RMS). The RMS can be installed on the Radiation Tracking System (RTRAK) or the Radiation Scanning System (RSS). These systems are described in the User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (Users Manual). Figure 3-1 identifies the portions of Area 3A/4A that will be targeted for real-time scanning. Areas that are covered with concrete, buildings, equipment, or debris will not be scanned with the RMS or HPGe. The former coal pile area was already scanned with the RMS under a separate PSP (20310-PSP-0001). The results of that activity will be reviewed to ensure that there are no additional exposed surface areas that can be scanned.

Real-time data gathered during this activity will be reported on an Excavation Monitoring Form (FS-F-5195). This form contains relevant information on the real-time data collection, characterization review of the data, and WAO acceptance of the characterization. The instructions for using this form are printed on the form. The Real-Time Field Lead, the Characterization Lead, and WAO representatives or designees will complete this form for each real-time measurement. The original forms will be placed in the WAO files.

3.1 RADIATION MEASUREMENT SYSTEM SCANNING COVERAGE (WAC PHASE I)

Real-time NaI detector system coverage with the RMS will be limited to safely accessible surfaces and will be as extensive as possible without jeopardizing worker or equipment safety. The real-time field team, supervisor, and project health and safety representative will jointly determine at the time of measurements which areas are accessible based on field conditions.

The NaI detector acquisition time will be set to 4 seconds and the data will be collected at a speed of one mile per hour. The onboard Global Positioning System (GPS) will be used to obtain positioning information with each detector measurement. Overlapping passes are achieved by placing the innermost tire track in the former outermost tire track from the previous pass, achieving an approximate 0.4-meter scanning overlap. Acquired data will be reviewed to determine if any single measurement exceeds 721 milligrams per kilogram (mg/kg) total uranium, the trigger level established for NaI WAC measurements. If this trigger is exceeded, an HPGe measurement may be taken to confirm the RMS measurement, as discussed in Section 3.3.

A minimum of two Troxler® or Infrared Moisture Meter soil moisture readings per acre will be obtained in the area covered by the RMS. These moisture readings are necessary because measurements from HPGe and RMS detectors need to be adjusted to take into account the soil moisture (i.e., results are reported on a dry weight basis).

3.2 HPGe DETECTOR MEASUREMENTS (WAC PHASE I)

The HPGe portable detector systems will be used to obtain gamma measurements in those areas that cannot be safely accessed by the RMS but are accessible to the HPGe detector (e.g., steep side slopes). The objective of the HPGe measurements is to cover areas that were not scanned by RMS, with the goal of covering as much of the exposed surface of Area 3A/4A as possible.

The HPGe detector system acquisition time will be set to 300 seconds (5 minutes). The detector height will be set at 1 meter above ground surface. All HPGe locations will be surveyed and marked. Each HPGe measurement will be identified as specified in Section 3.4. One Troxler® or Infrared Moisture Meter soil moisture reading will be obtained at each HPGe measurement point.

One duplicate measurement will be taken for every 20 HPGe measurements collected for this project. The duplicate will immediately follow the original reading and will be conducted using the same detector with the same height and count time.

The HPGe data will be reviewed to determine if any single measurement exceeds a total uranium concentration of 400 mg/kg, which is the trigger level established for HPGe WAC measurements taken at a 1-meter height. If this trigger is exceeded, an additional HPGe measurement at a lower detector height may be taken, as discussed in Section 3.3.

3.3 DETERMINING NEED FOR ADDITIONAL HPGe MEASUREMENTS (WAC PHASE II)

If RMS scans or 1-meter detector height HPGe measurements are greater than trigger level concentrations, confirmation and delineation may be required. This confirmation and delineation process is documented in Section 3.4 of the User's Manual. The circumscribed boundary of the RMS or 1-meter HPGe measurement above trigger limits will be located and marked (flags and/or stakes) by the Characterization, Real-Time and/or Survey Lead or designee. The location of the maximum activity will be identified in the field using a hand-held frisker or equivalent instrument. HPGe detectors will be used for all confirmation and delineation measurements. Potential above-WAC areas identified by the RMS confirmed using the HPGe at the 31-cm detector height and then the 15-cm detector height. Potential above-WAC areas identified by the HPGe at the 1-meter detector height will be confirmed using the HPGe at the 31-cm detector height. All HPGe confirmation measurements will be performed using the 5-minute spectral acquisition time. If any confirmation measurement is equal to or exceeds the HPGe trigger level of 928 parts per million (ppm), then the area exceeding the trigger level (i.e., above-WAC) shall be further delineated with the HPGe. The boundary of confirmed above-WAC material shall be defined (delineated) using a detector height of 15 cm, a spectral acquisition time of five minutes, and a 90 percent coverage 2-meter triangular grid covering the entire area identified by the detection and confirmation measurements. The limits of the total uranium above-WAC area will be defined by HPGe measurements that are lower than the HPGe WAC trigger level of 928 ppm.

Confirming and delineating the extent of contamination with 31-cm and 15-cm HPGe measurements is at the discretion of the Characterization Lead or designee. Conditions may arise which warrant a different decision process for defining the extent of contamination (i.e., cost effectiveness, need for timely response, obvious discoloration in the soil, or other suspect above-WAC material may require physical sampling). The decision process for the unusual condition will be documented in applicable field activity logs and, if determined to be appropriate by the Characterization Lead or designee, with a V/FCN as described in Section 5.4.

Duplicate HPGe measurements will be performed in the same manner described in Section 3.2 (i.e., one per 20 measurements).

3.4 REAL-TIME MEASUREMENT IDENTIFICATION

Data from each run of the RMS will be uniquely identified. This identifier will consist of a prefix designating the area name (3A4A) followed by the run number, which is assigned by the real-time scanning personnel. For example, 3A4A-265 would be run 265 in Area 3A/4A.

Each HPGe measurement will have a unique identifier. This identifier will consist of a prefix designating the area name (3A4A), followed by the sample number within the area (1 through x), followed by a letter designating the type of sample ("G" for gamma). A "D" will be used to designate the duplicate measurements. For example:

3A4A-1-G-D is the first HPGe reading taken in Area 3A/4A and is a duplicate measurement.

3.5 DATA MAPPING

As the measurements are acquired by the Survey and Real-Time Teams, the data will be electronically loaded into mapping software through manual file transfer or Ethernet. A set of maps and/or data summaries will be given to the Characterization Lead and WAO. Maps will be generated showing Northing (Y) and Easting (X) coordinate values (Ohio South Zone, #3402) as determined using standard survey practices and standard positioning instrumentation (electronic total stations and GPS receivers). The map will depict the following:

Surface Scan Coverage Map(s)

- RMS Location Map - showing field of view squares that are color coded for total uranium concentration and denotes batch numbers in title.

- HPGe Location Map - showing field of view circles that are color coded for total uranium concentration and that denotes identification number for each HPGe measurement. Also attach data printout that summarizes each HPGe measurement parameters and shows total uranium concentration.

(Note both results can be shown on the same map.)

HPGe Confirmation/Delineation Map(s)

- HPGe Location Map - showing field of view circles that are color coded for total uranium concentration and that denotes identification number for each HPGe measurement. Also attach data printout that summarizes each HPGe measurement parameters and shows total uranium concentration.

The map and/or HPGe data summary printouts will be used to provide the Characterization Lead or designee with information to determine if additional scanning, confirmation, or delineation measurements are required.

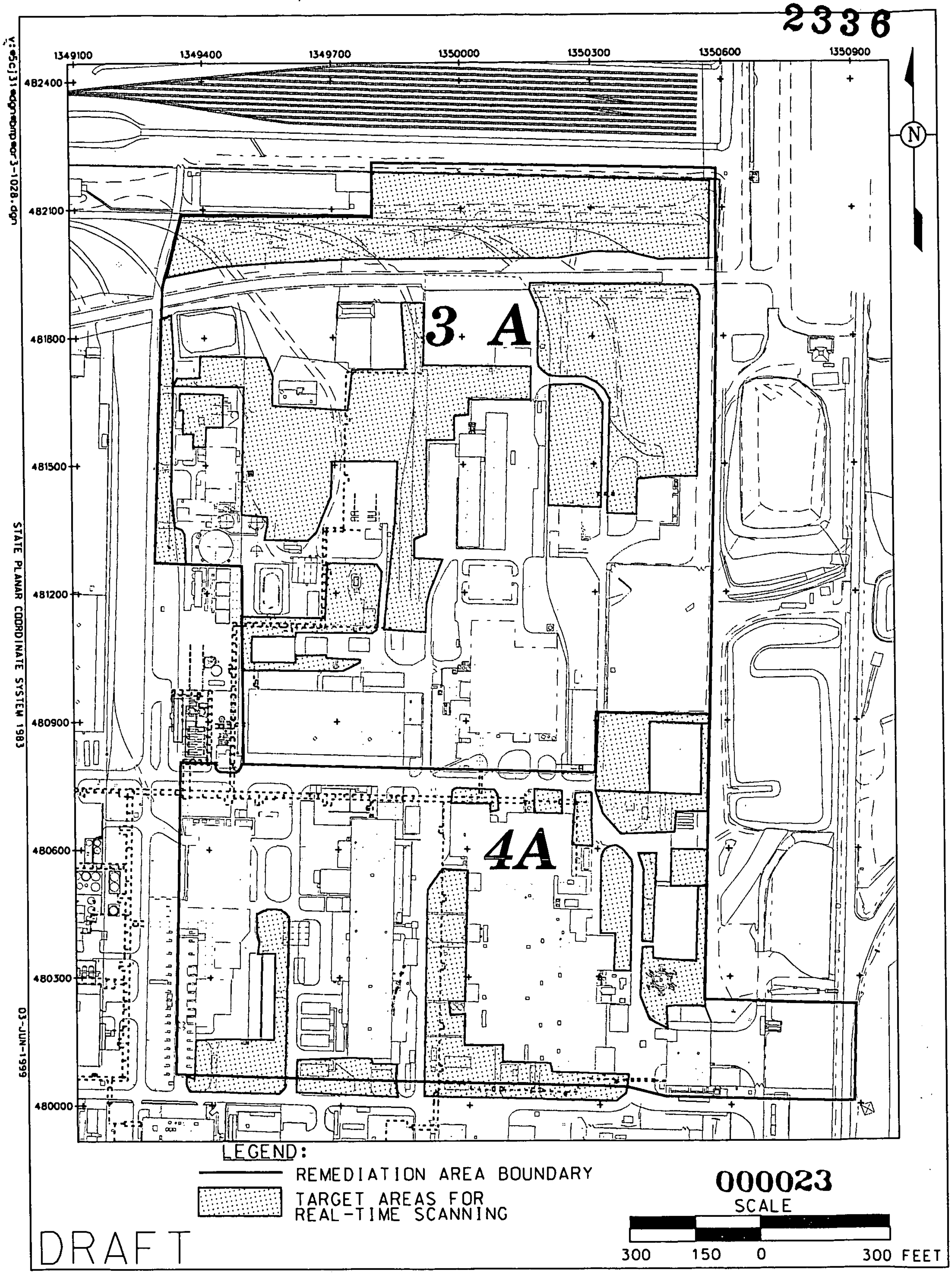

FIGURE 3-1. AREA 3A/4A REAL-TIME SCAN AREAS FOR TOTAL URANIUM

4.0 HWMU AND UST SURVEYING

There are two previously-removed USTs and one HWMU that require demonstration of FRL attainment following excavation (Figure 4-1). The footprint of each of these areas, including a 5-foot buffer, will be established through field surveying in 1983 State Planar Coordinates (northing and easting) and will be documented following implementation of this PSP. These defined footprints will then be the starting points for certification sampling following soil excavation to demonstrate attainment of FRLs for the HWMU- or UST-specific constituents of concern. One additional UST (UST No. 14) is located under the floor of Plant 6 and will be removed during excavation. The footprint of that area will be established during excavation.

The Storage Pad North of Plant 6 was designated HWMU No. 36 based upon continued storage of hazardous waste after production in excess of the 90-day storage limit. The Storage Pad is a flat concrete pad eight feet wide and 40 feet long and has a 6-inch concrete curb along its eastern boundary, a concrete driveway to the west, Plant 6 to the south, and Second Street to the north (Figure 4-2). The waste stored on this pad included wet filter cake and oily sludge, both of which are from the wastewater treatment system at Plant 6. Lead and 1,1,1-trichloroethane are the constituents of concern pertaining to this HWMU.

UST No. 3 was located northeast of Building 24B, the Railroad Engine House (Figure 4-3). It contained diesel fuel and had a volume of 12,500 gallons. UST No. 3 was removed in 1990 and soil samples collected at that time indicate that soil exceeding the FRLs was excavated during the removal action. The constituents of concern presented in the SEP for this UST area are benzene, ethylbenzene, toluene, xylene, barium, lead, and mercury. The surveyors will use the center coordinates and the tank dimensions of 10-foot diameter by 21-foot length to determine the footprint of the area.

UST No. 6 was located approximately 1 foot north of the Maintenance Building (Building 12) at the northwest corner (Figure 4-4). The tank held up to 1,000 gallons of gasoline and was removed in 1990. Soil samples collected after removal indicate that soil exceeding the FRLs was excavated during the removal action. The constituents of concern presented in the SEP with corresponding FRLs for this UST area are acetone, benzene, carbon tetrachloride, 1,2-dichloroethane, 1,1-dichloroethene, ethylbenzene, tetrachloroethene, toluene, trichloroethene, xylene, arsenic, cadmium, chromium, lead, mercury, and selenium. The surveyors will use the center coordinates and the tank dimensions of 4-foot diameter by 12-foot length to determine the footprint of the area.

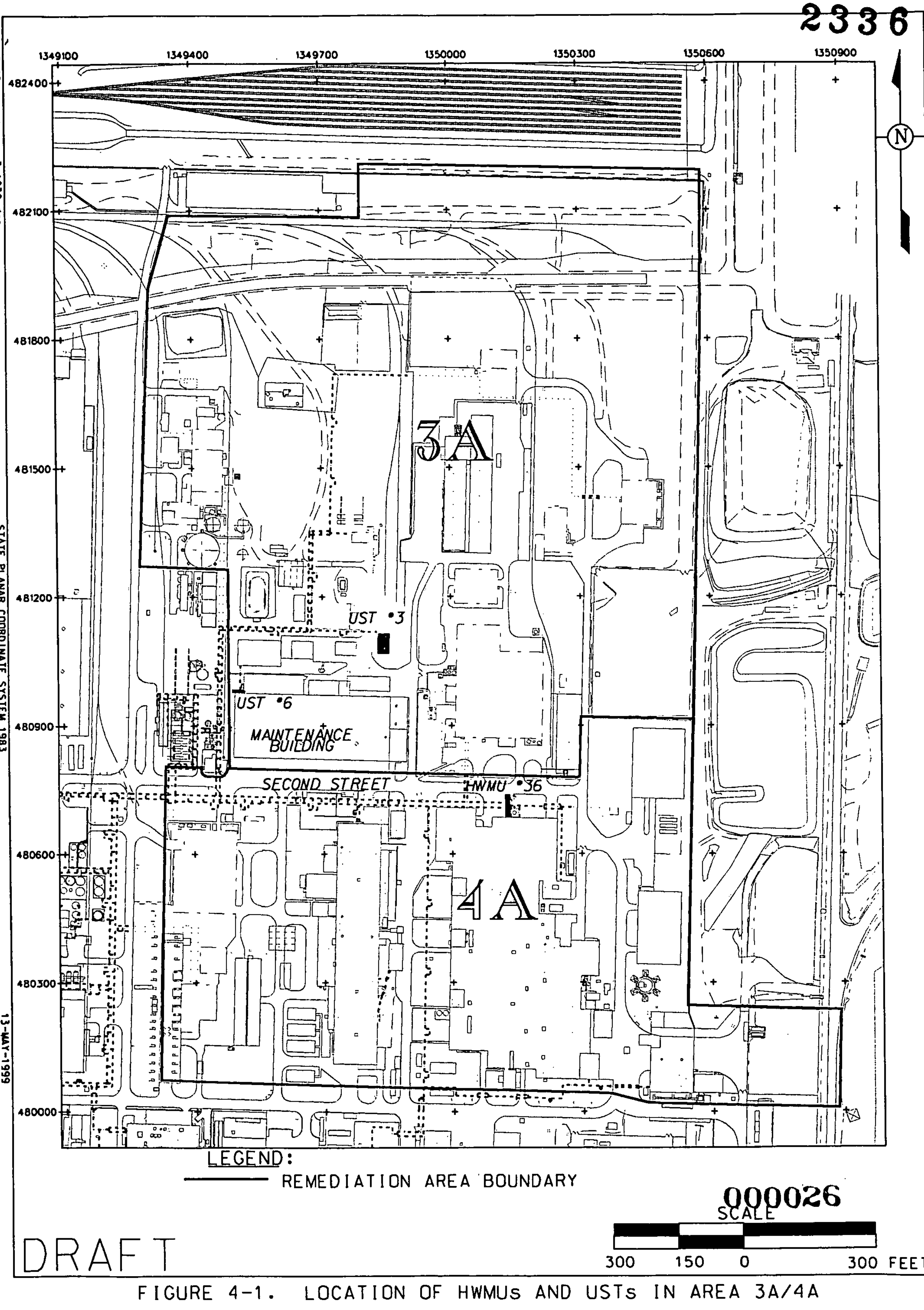

FIGURE 4-1. LOCATION OF HWMUs AND USTs IN AREA 3A/4A

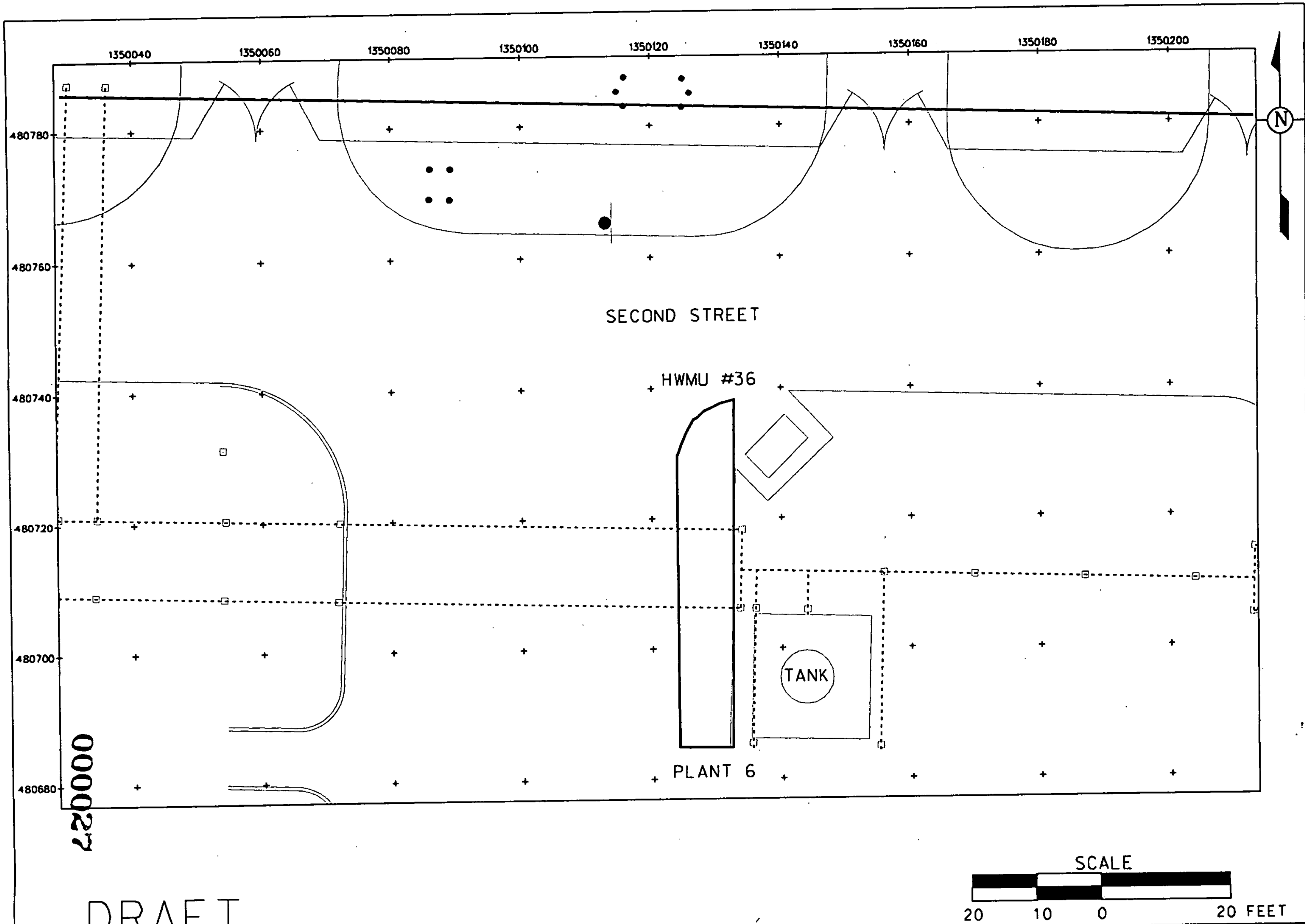

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FIGURE 4-2. HWMU NO. 36

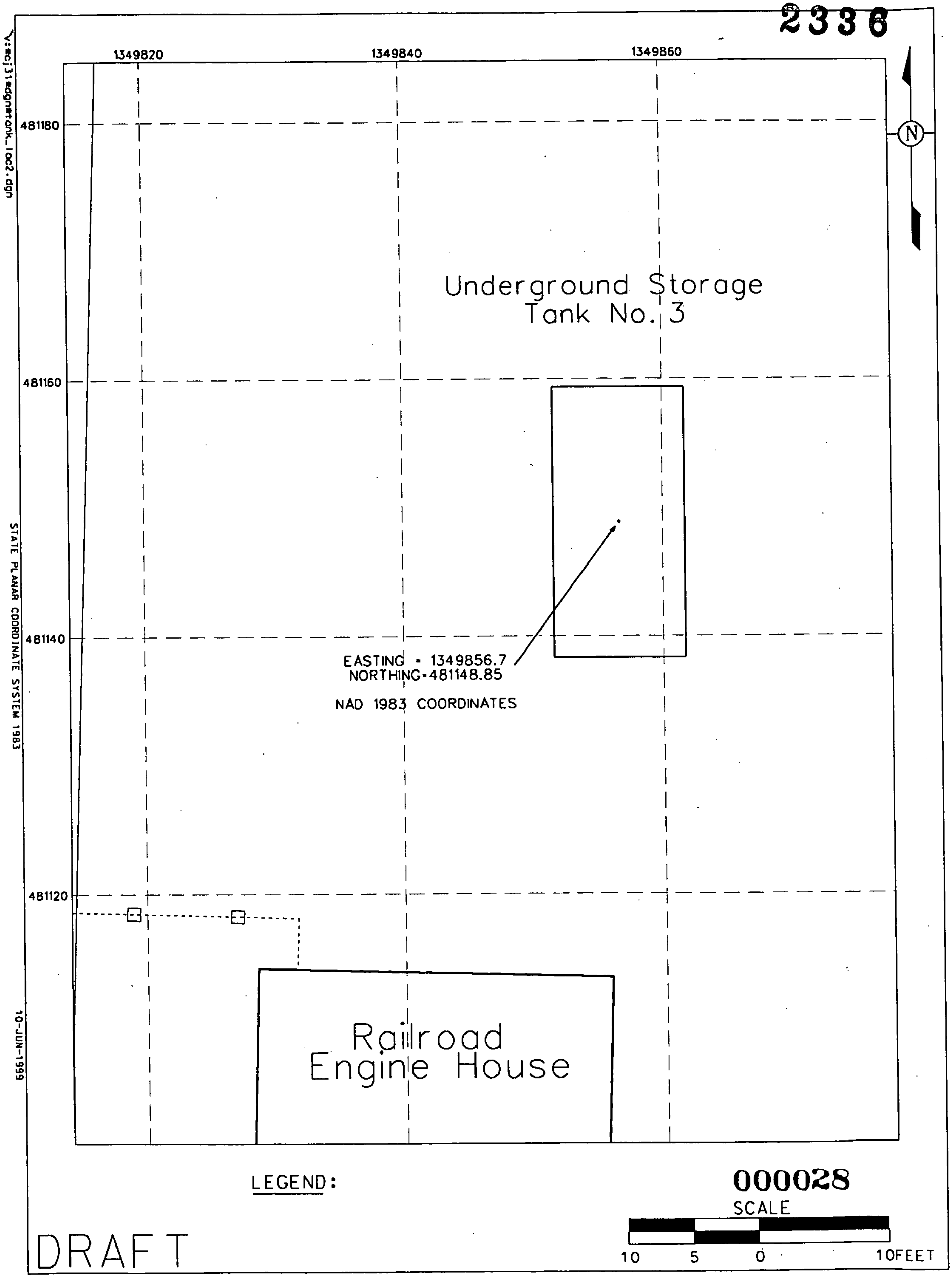

FIGURE 4-3. UNDERGROUND STORAGE TANK NO. 3

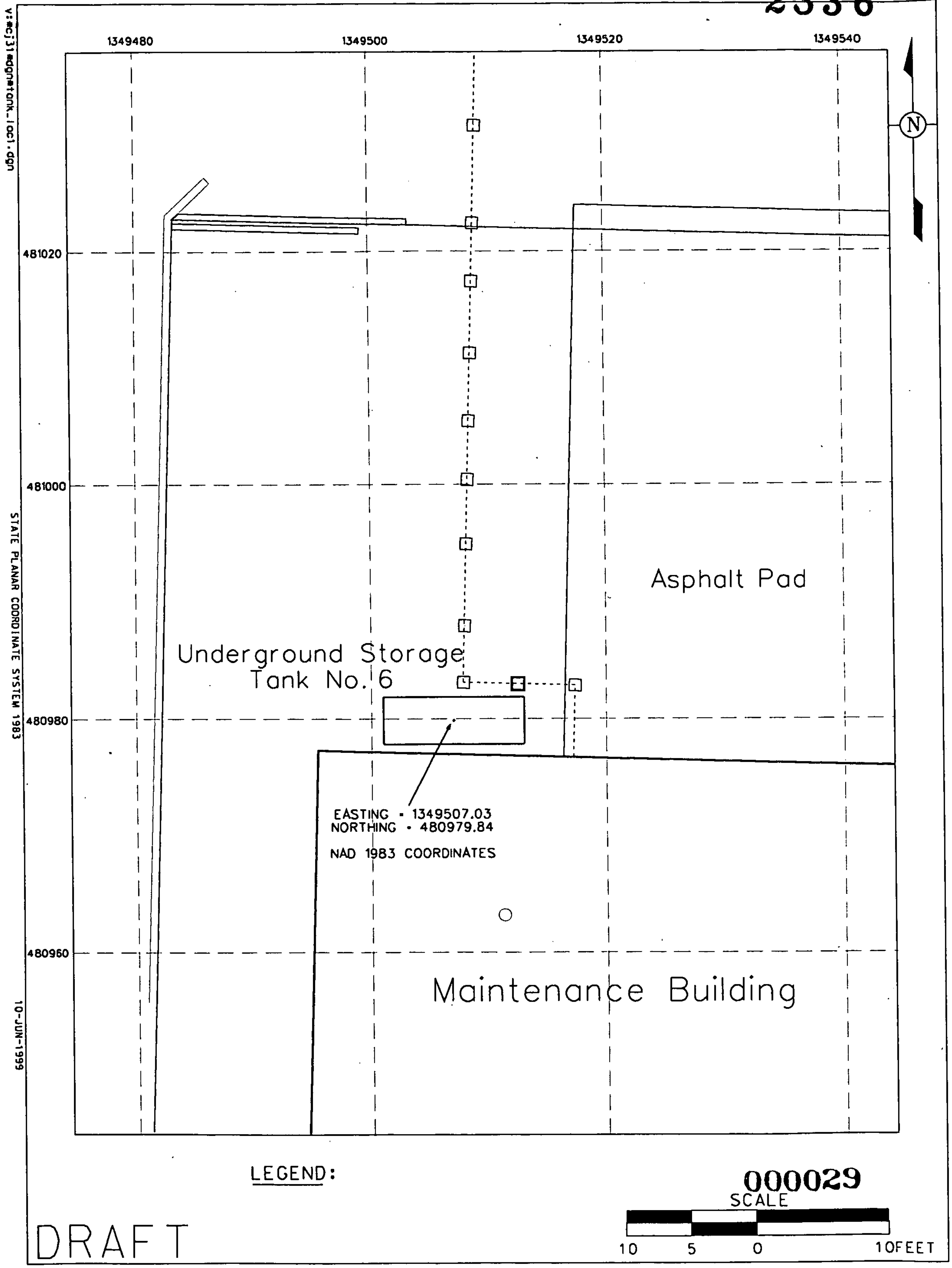

FIGURE 4-4. UNDERGROUND STORAGE TANK NO. 6

5.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

5.1 FIELD QUALITY CONTROL SAMPLES, ANALYTICAL REQUIREMENTS, AND DATA VALIDATION

In accordance with the requirements of DQO SL-048, Rev. 5 and DQO SL-053, Rev. 0 (see Appendix B), the field quality control, analytical, and data validation requirements are as follows:

- All laboratory analyses will be performed at analytical support level (ASL) B. (ASLs are defined in the SCQ.)
- All field data will be validated. All analytical data will require a certificate of analysis, and 10 percent of the analytical data will also require the associated quality assurance/quality control results. A minimum of 10 percent of the analytical data will be validated to ASL B.
- Real-time measurements will be performed at ASL A and will not require data validation.
- One in 20 HPGe measurements will require a duplicate.

If any sample collection or analysis methods are used that are not in accordance with the SCQ, the Project Manager and Characterization Lead must determine if the qualitative data from the samples will be beneficial to predesign decision making. If the data will be beneficial, the Project Manager and Characterization Lead will ensure that:

- the PSP is varianced to include references confirming that the new method is sufficient to support data needs,
- variations from the SCQ methodology are documented in the PSP, or
- data validation of the affected samples is requested or qualifier codes of J (estimated) and R (rejected) be attached to detected and nondetected results, respectively.

5.2 PROJECT-SPECIFIC PROCEDURES, MANUALS, AND DOCUMENTS

To assure consistency and data integrity, field activities in support of this PSP will follow the requirements and responsibilities outlined in controlled procedures and manufacturer operational manuals. Applicable procedures, manuals, and documents include:

- SMPL-01, *Solids Sampling*
- SMPL-21, *Collection of Field Quality Control Samples*
- EQT-05, *Geodimeter® 4000 Survey System - Operation, Maintenance, and Calibration*
- EQT-06, *Geoprobe® Model 5400 Operation and Maintenance Manual*
- EQT-22, *Characterization of Gamma Sensitive Detectors*
- EQT-23, *Operation of ADCAM Series Analyzers with Gamma Sensitive Detectors*
- EQT-32, *Troxler® 3440 Series Surface Moisture/Density Gauge - Calibration, Operation, and Maintenance*
- EQT-33, *Real-Time Differential Global Positioning System Operation*
- EQT-39, *Zeltex Infrared Moisture Meter*
- EQT-41, *Radiation Measurement Systems*
- 34-10-501, *Shipping Samples to Off-Site Laboratories*
- *Sitewide CERCLA Quality Assurance Project Plan (SCQ)*
- *In-Situ Gamma Spectrometry Addendum to the Sitewide CERCLA Quality Assurance Project Plan (SCQ)*
- *RTRAK Applicability Study*
- *Sitewide Excavation Plan (SEP)*
- *User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (User's Manual)*
- *Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility*

5.3 PROJECT REQUIREMENTS FOR INDEPENDENT ASSESSMENTS

Project management has ultimate responsibility for the quality of the work processes and the results of the sampling activities covered by this PSP. The Quality Assurance (QA) organization will conduct independent assessments of the work process and operations to assure the quality of performance. Assessment will encompass technical and procedural requirements of this PSP and the SCQ. Independent assessments will be performed by conducting a surveillance. Surveillances will be planned and documented according to Section 12.3 of the SCQ.

5.4 IMPLEMENTATION OF FIELD CHANGES

If field conditions require changes or variances, the Field Sampling Lead must obtain written or verbal approval (electronic mail is acceptable) from the Characterization Lead, QA, and WAO before the changes may be implemented. If the change involves real-time scanning, the Real-Time Lead must also give written or verbal approval before the change can be implemented. Changes to this PSP will be noted in the applicable Field Activity Logs and on a V/FCN.. QA must receive the completed V/FCN, which includes the signatures of the Characterization Lead, Sampling Lead, Project Manager, WAO, QA, and Real-Time Lead within seven working days of implementation of the change.

6.0 HEALTH AND SAFETY

The Health and Safety Lead, Field Sampling Leads, and team members will assess the safety of performing sampling activities in Area 3A/4A. This will include vehicle/equipment positioning limitations and fall hazards.

Technicians will conform to precautionary surveys performed by personnel representing the Radiological Control, Safety, and Industrial Hygiene organizations. All work on this project will be performed in accordance with applicable Environmental Monitoring procedures, RM-0020 (Radiological Control Requirements Manual), RM-0021 (Safety Performance Requirements Manual), Fluor Daniel Fernald work permit, Radiological Work Permit (RWP), penetration permit and other applicable permits. Concurrence with applicable safety permits (indicated by the signature of each field team member assigned to this project) is required by each team member in the performance of their assigned duties.

The Field Sampling Lead and Real-Time Lead will ensure that each technician performing work related to this project has been trained to the relevant sampling procedures including safety precautions. Technicians who do not sign project safety and technical briefing forms will not participate in the execution of activities related to the completion of assigned project responsibilities. A copy of applicable safety permits/surveys issued for worker safety and health will be posted in the affected area during field activities.

A safety briefing will be conducted prior to the initiation of field activities. All emergencies will be reported immediately to the site communication center at 648-6511 or by contacting "control" on the radio.

7.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the investigation will be properly managed to satisfy data end use requirements after completion of the field activities. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on a Field Activity Log, which should be sufficient for accurate reconstruction of the events at a later date without reliance on memory. Sample Collection Logs will be completed according to protocol specified in Appendix B of the SCQ and in applicable procedures. These forms will be maintained in loose-leaf form and uniquely numbered following the field sampling event. At least weekly, a copy of all field logs will be sent to the Characterization Lead.

Real-time data will be reported on an Excavation Monitoring Form. All field measurements, observations, and sample collection information associated with physical sample collection will be recorded, as applicable, on the Sample Collection Log, the Field Activity Log, and the Chain of Custody/Request for Analysis Form as required. The method of sample collection will be specified in the Field Activity Log. Borehole Abandonment Logs are required for the total uranium borings. The PSP number (20200-PSP-0004) will be on all documentation associated with these sampling activities.

Samples will be assigned a unique sample number, as explained in Section 2.3 and listed in Appendix C. This unique sample identifier will appear on the Sample Collection Log and Chain of Custody/Request for Analysis and will be used to identify the samples during analysis, data entry, and data management.

Technicians will review all field data for completeness and accuracy and then forward the data package to the Data Validation Contact for final review. The field data package will be filed in the records of the Environmental Management Project. All other records associated with this PSP will reference the PSP number and be forwarded to Engineering Control/Document Control to be placed in the project file.

The Data Management organization will perform data entry into the SED. Analytical data from the off-site laboratory will be reviewed by the Data Management Lead prior to entry or transfer of the data to the SED from the FACTS database. The analytical data validation requirements are outlined in

Section 5.1. After entry into the SED, a data group form will be completed for each material tracking location (as identified by WAO) and transmitted to WAO for WAC documentation.

APPENDIX A

ABOVE-WAC RESULTS FROM AREA 3A/4A

APPENDIX A

ABOVE-WAC RESULTS FROM AREA 3A/4A SURFACE SOIL

BORING	SAMPLE ID	SAMPLE DATE	MATERIAL	SAMPLE DEPTH		PARAMETER	RESULT	QUALIFIER	OSDF WAC	NORTHING	EASTING
				TOP	BOTTOM						
1139	55120	03-Jul-89	SOIL	0	0.5	Uranium, Total	90350 mg/kg	NV	1030 mg/kg	480630.44	1350171.91
1139	55120	03-Jul-89	SOIL	0	0.5	Uranium, Total	39180 mg/kg	-	1030 mg/kg	480630.44	1350171.91
SP-54	92-178-5160	17-Sep-92	SOIL	0	0.5	Uranium, Total	3890 mg/kg	NV	1030 mg/kg	481631.44	1350479.96
SP-16	92-178-5120	15-Sep-92	SOIL	0	0.5	Uranium, Total	3850 mg/kg	NV	1030 mg/kg	481921.44	1350312.96
SP-19	92-178-5125	15-Sep-92	SOIL	0	0.5	Uranium, Total	3460 mg/kg	NV	1030 mg/kg	481920.44	1350455.96
SP-23	92-178-5129	15-Sep-92	SOIL	0	0.5	Uranium, Total	2920 mg/kg	NV	1030 mg/kg	481879.44	1350431.96
SP-50	92-178-5158	17-Sep-92	SOIL	0	0.5	Uranium, Total	2270 mg/kg	NV	1030 mg/kg	481673.44	1350503.95
ZONE 1-320	5385	20-Apr-88	SOIL	0.5	1	Uranium, Total	2270 mg/kg	NV	1030 mg/kg	481887.44	1349865.97
SP-43	92-178-5152	17-Sep-92	SOIL	0	0.5	Uranium, Total	1840 mg/kg	NV	1030 mg/kg	481713.44	1350432.96
18	20051	12-Mar-88	SOIL	0	1	Uranium, Total	1780 mg/kg	J	1030 mg/kg	481579.41	1350430.97
SP-24	92-178-5132	16-Sep-92	SOIL	0	0.5	Uranium, Total	1690 mg/kg	NV	1030 mg/kg	481879.44	1350480.96
1505	568	20-Feb-90	SOIL	0	0.5	Uranium, Total	1637 mg/kg	-	1030 mg/kg	481866.04	1350394.66
SP-17	92-178-5121	15-Sep-92	SOIL	0	0.5	Uranium, Total	1630 mg/kg	NV	1030 mg/kg	481921.44	1350359.96
1505	569	20-Feb-90	SOIL	0.5	1	Uranium, Total	1474 mg/kg	-	1030 mg/kg	481866.04	1350394.66
SP-20	92-178-5126	15-Sep-92	SOIL	0	0.5	Uranium, Total	1430 mg/kg	NV	1030 mg/kg	481921.44	1350504.95
1145	15870	15-Aug-89	SOIL	0.5	1	Uranium, Total	1416 mg/kg	J	1030 mg/kg	480480.06	1350214.42
11107	122446	07-Aug-93	SOIL	0	0.5	Uranium, Total	1086 mg/kg	-	1030 mg/kg	480415.77	1350309.78
SP-72	92-178-5181	17-Sep-92	SOIL	0	0.5	Uranium, Total	1070 mg/kg	NV	1030 mg/kg	481922.44	1350263.96
SP-13	92-178-5117	15-Sep-92	SOIL	0	0.5	Uranium, Total	1030 mg/kg	NV	1030 mg/kg	481963.44	1350432.96
KC2-2	99261	01-Feb-93	SOIL	0	0.5	4-Nitroaniline	330 ug/kg	J	44.2 ug/kg*	482071.49	1349489.09
11198	121670	13-Jul-93	SOIL	0	0.5	Bis(2-chloroisopropyl)ether	48 ug/kg	J	24.4 ug/kg*	481396.77	1349596.16

* Because current analytical methods are unable to achieve reliable detection levels at the WAC for 4-nitroaniline and bis(2-chloroisopropyl)ether, the current EPA Contract Laboratory Program Contract Required Detection Limits of 830 ug/kg for 4-nitroaniline and 330 ug/kg for bis(2-chloroisopropyl)ether will be used as the WAC attainment values. See Section 1.3 for a more detailed discussion of this issue.

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APPENDIX B

DATA QUALITY OBJECTIVES SL-048, REV. 5
AND
DATA QUALITY OBJECTIVES SL-055, REV. 0

Control Number 2336

Fernald Environmental Management Project

Data Quality Objectives

Title: Delineating the Extent of Constituents of Concern During Remediation Sampling

Number: SL-048

Revision: 5

Effective Date: February 26, 1999

Contact Name: Eric Kroger

Approval: (signature on file) Date: 2/25/99
James E. Chambers
DQO Coordinator

Approval: (signature on file) Date: 2/26/99
J.D. Chiou
SCEP Project Director

Rev. #	0	1	2	3	4	5	6
Effective Date:	9/19/97	10/3/97	4/15/98	6/17/98	7/14/98	2/26/99	

DATA QUALITY OBJECTIVES

Delineating the Extent of Constituents of Concern During Remediation Sampling

Members of Data Quality Objectives (DQO) Scoping Team

The members of the DQO team include a project lead, a project engineer, a field lead, a statistician, a lead chemist, a sampling supervisor, and a data management lead.

Conceptual Model of the Site

Media is considered contaminated if the concentration of a constituent of concern (COC) exceeds the final remediation levels (FRLs). The extent of specific media contamination was estimated and published in the Operable Unit 5 Feasibility Study (FS). These estimates were based on kriging analysis of available data for media collected during the Remedial Investigation (RI) effort and other FEMP environmental characterization studies. Maps outlining contaminated media boundaries were generated for the Operable Unit 5 FS by overlaying the results of the kriging analysis data with isoconcentration maps of the other constituents of concern (COCs), as presented in the Operable Unit 5 RI report, and further modified by spatial analysis of maps reflecting the most current media characterization data. A sequential remediation plan has been presented that subdivides the FEMP into seven construction areas. During the course of remediation, areas of specific media may require additional characterization so remediation can be carried out as thoroughly and efficiently as possible. As a result, additional sampling may be necessary to accurately delineate a volume of specific media as exceeding a target level, such as the FRL or the Waste Attainment Criterion (WAC). Each individual Project-Specific Plan (PSP) will identify and describe the particular media to be sampled. This DQO covers all physical sampling activities associated with Pre-design Investigations, precertification sampling, WAC attainment sampling or regulatory monitoring that is required during site remediation.

1.0 Statement of Problem

If the extent (depth and/or area) of the media COC contamination is unknown, then it must be defined with respect to the appropriate target level (FRL, WAC, or other specified media concentration).

2.0 Identify the Decision

Delineate the horizontal and/or vertical extent of media COC contamination in an area with respect to the appropriate target level.

3.0 Inputs That Affect the Decision

Informational Inputs - Historical data, process history knowledge, the modeled extent of COC contamination, and the origins of contamination will be required to establish a sampling plan to delineate the extent of COC contamination. The desired precision of the delineation must be weighed against the cost of collecting and analyzing additional samples in order to determine the optimal sampling density. The project-specific plan will identify the optimal sampling density.

Action Levels - COCs must be delineated with respect to a specific action level, such as FRLs and On-Site Disposal Facility (OSDF) WAC concentrations. Specific media FRLs are established in the OU2 and OU5 RODs, and the WAC concentrations are published in the OU5 ROD. Media COCs may also require delineation with respect to other action levels that act as remediation drivers, such as Benchmark Toxicity Values (BTVs).

4.0 The Boundaries of the Situation

Temporal Boundaries - Sampling must be completed within a time frame sufficient to meet the remediation schedule. Time frames must allow for the scheduling of sampling and analytical activities, the collection of samples, analysis of samples and the processing of analytical data when received.

Scale of Decision Making - The decision made based upon the data collected in this investigation will be the extent of COC contamination at or above the appropriate action level. This delineation will result in media contaminant concentration information being incorporated into engineering design, and the attainment of established remediation goals.

Parameters of Interest - The parameters of interest are the COCs that have been determined to require additional delineation before remediation design can be finalized with the optimal degree of accuracy.

5.0 Decision Rule

If existing data provide an unacceptable level of uncertainty in the COC delineation model, then additional sampling will take place to decrease the model uncertainty. When deciding what additional data is needed, the costs of additional sampling and analysis must be weighed against the benefit of reduced uncertainty in the delineation model, which will eventually be used for assigning excavation, or for other purposes.

6.0 Limits on Decision Errors

In order to be useful, data must be collected with sufficient areal and depth coverage, and at sufficient density to ensure an accurate delineation of COC concentrations. Analytical sensitivity and reproducibility must be sufficient to differentiate the COC concentrations below their respective target levels.

Types of Decision Errors and Consequences

Decision Error 1 - This decision error occurs when the decision maker determines that the extent of media contaminated with COCs above action levels is not as extensive as it actually is. This error can result in a remediation design that fails to incorporate media contaminated with COC(s) above the action level(s). This could result in the re-mobilization of excavation equipment and delays in the remediation schedule. Also, this could result in media contaminated above action levels remaining after remediation is considered complete, posing a potential threat to human health and the environment.

Decision Error 2 - This decision error occurs when the decision maker determines that the extent of media contaminated above COC action levels is more extensive than it actually is. This error could result in more excavation than necessary, and this excess volume of materials being transferred to the OSDF, or an off-site disposal facility if contamination levels exceed the OSDF WAC.

True State of Nature for the Decision Errors - The true state of nature for Decision Error 1 is that the maximum extent of contamination above the FRL is more extensive than was determined. The true state of nature for Decision Error 2 is that the maximum extent of contamination above the FRL is not as extensive as was determined. Decision Error 1 is the more severe error.

7.0 Optimizing Design for Useable Data

7.1 Sample Collection

A sampling and analytical testing program will delineate the extent of COC contamination in a given area with respect to the action level of interest. Existing data, process knowledge, modeled concentration data, and the origins of contamination will be considered when determining the lateral and vertical extent of sample collection. The cost of collecting and analyzing additional samples will be weighed against the benefit of reduced uncertainty in the delineation model. This will determine the sampling density. Individual PSPs will identify the locations and depths to be sampled, the sampling density necessary to obtain the desired accuracy of the delineation, and if samples will be analyzed by the on-site or off-site laboratory. The PSP will also identify the sampling increments to be selectively analyzed for concentrations of the COC(s) of interest, along with field work requirements. Analytical requirements will be listed in the PSP. The chosen analytical methodologies are able to achieve a detection limit capable of resolving the COC action level. Sampling of groundwater monitoring wells may require different purge requirements than those stated in the SCQ (i.e., dry well definitions or small purge volumes). In order to accommodate sampling of wells that go dry prior to completing the purge of the necessary well volume, attempts to sample the monitoring wells will be made 24 hours after purging the well dry. If, after the 24 hour period, the well does not yield the required volume, the analytes will be collected in the order stated in the applicable PSP until the well goes dry. Any remaining analytes will not be collected. In some instances, after the 24 hour wait the well may not yield any water. For these cases, the well will be considered dry and will not be sampled.

7.2 COC Delineation

The media COC delineation will use all data collected under the PSP, and if deemed appropriate by the Project Lead, may also include existing data obtained from physical samples, and if applicable, information obtained through real-time screening. The delineation may be accomplished through modeling (e.g. kriging) of the COC concentration data with a confidence limit specific to project needs that will reduce the potential for Decision Error 1. A very conservative approach to delineation may also be utilized where the boundaries of the contaminated media are extended to the first known vertical and horizontal sample locations that reveal concentrations below the desired action level.

7.3 QC Considerations

Laboratory work will follow the requirements specified in the SCQ. If analysis is to be carried out by an off-site laboratory, it will be a Fluor Daniel Fernald approved full service laboratory. Laboratory quality control measures include a media prep blank, a laboratory control sample (LCS), matrix duplicates and matrix spike. Typical Field QC samples are not required for ASL B analysis. However the PSPs may specify appropriate field QC samples for the media type with respect to the ASL in accordance with the SCQ, such as field blanks, trip blanks, and container blanks. All field QC samples will be analyzed at the associated field sample ASL. Data will be validated per project requirements, which must meet the requirements specified in the SCQ. Project-specific validation requirements will be listed in the PSP.

Per the Sitewide Excavation Plan, the following ASL and data validation requirements apply to all **soil and soil field QC samples** collected in association with this DQO:

- If samples are analyzed for Pre-design Investigations and/or Precertification, 100% of the data will be analyzed per ASL B requirements. For each laboratory used for a project, 90% of the data will require only a Certificate of Analysis, the other 10% will require the Certificate of Analysis and all associated QA/QC results, and will be validated to ASL B. Per Appendix H of the SEP, the minimum detection level (MDL) for these analyses will be established at approximately 10% of the action level (the action level for precertification is the

FRL; the action level for pre-design investigations can be several different action levels, including the FRL, the WAC, RCRA levels, ALARA levels, etc.). If this MDL is different from the SCQ-specified MDL, the ASL will default to ASL E, though other analytical requirements will remain as specified for ASL B.

- If samples are analyzed for WAC Attainment and/or RCRA Characteristic Areas Delineation, 100% of the data will be analyzed and reported to ASL B with 10% validated. The ASL B package will include a Certificate of Analysis along with all associated QA/QC results. Total uranium analyses using a higher detection limit than is required for ASL B (10 mg/kg) may be appropriate for WAC attainment purposes since the WAC limit for total uranium is 1,030 mg/kg. In this case, an ASL E designation will apply to the analysis and reporting to be performed under the following conditions:

    - all of the ASL B laboratory QA/QC methods and reporting criteria will apply with the exception of the total uranium detection limit

    - the detection limit will be ≤10% of the WAC limit (e.g., ≤103 mg/kg for total uranium).

- If delineation data are also to be used for certification, the data must meet the data quality objectives specified in the Certification DQO (SL-043).

- Validation will include field validation of field packages for ASL B or ASL D data.

All data will undergo an evaluation by the Project Team, including a comparison for consistency with historical data. Deviations from QC considerations resulting from evaluating inputs to the decision from Section 3, must be justified in the PSP such that the objectives of the decision rule in Section 5 are met.

7.4 Independent Assessment

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances. Surveillances will be planned and documented in accordance with Section 12.3 of the SCQ.

7.5 Data Management

Upon receipt from the laboratory, all results will be entered into the SED as qualified data using standard data entry protocol. The required ASL B, D or E data will undergo analytical validation by the FEMP validation team, as required (see Section 7.3). The Project Manager will be responsible to determine data usability as it pertains to supporting the DQO decision of determining delineation of media

COC's.

7.6 Applicable Procedures

Sample collection will be described in the PSP with a listing of applicable procedures. Typical related plans and procedures are the following:

- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ).
- SMPL-01, *Solids Sampling*
- SMPL-02, *Liquids and Sludge Sampling*
- SMPL-21, *Collection of Field Quality Control Samples*
- EQT-06, *Geoprobe® Model 5400 Operation and Maintenance*
- EQT-23, *Operation of High Purity Germanium Detectors*
- EQT-30, *Operation of Radiation Tracking Vehicle Sodium Iodide Detection System*

Data Quality Objectives
Delineating the Extent of Constituents of Concern During Remediation Sampling

1A. Task/Description: Delineating the extent of contamination above the FRLs

1.B. Project Phase: (Put an X in the appropriate selection.)

RI [ ] FS [ ] RD [X] RA [ ] R$_v$A [ ] OTHER [ ]

1.C. DQO No.: SL-048, Rev. 5 DQO Reference No.:__________

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2. Media Characterization: (Put an X in the appropriate selection.)

Air [ ] Biological [ ] Groundwater [X] Sediment [X] Soil [X]

Waste [X] Wastewater [ ] Surface water [ ] Other (specify) _____

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3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization
A [ ] B [X] C [ ] D [X] E [X]

Risk Assessment
A [ ] B [ ] C [ ] D [ ] E [ ]

Evaluation of Alternatives
A [ ] B [ ] C [ ] D [ ] E [ ]

Engineering Design
A [ ] B [X] C [ ] D [X] E [X]

Monitoring during remediation
A [X] B [X] C [ ] D [X] E [X]

Other
A [ ] B [ ] C [ ] D [ ] E [ ]

4.A. Drivers: Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and the OU2 and/or OU5 Record of Decision (ROD).

4.B. Objective: Delineate the extent of media contaminated with a COC (or COCs) with respect to the action level(s) of interest.

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5. Site Information (Description):

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH	[X] *	2. Uranium	[X] *	3. BTX	[ ]
Temperature	[X] *	Full Radiological	[X] *	TPH	[ ]
Specific Conductance	[X] *	Metals	[X] *	Oil/Grease	[ ]
Dissolved Oxygen	[X] *	Cyanide	[ ]		
Technetium-99	[X] *	Silica	[ ]		

4. Cations	[ ]	5. VOA	[X] *	6. Other (specify)
Anions	[ ]	BNA	[X] *	
TOC	[ ]	Pesticides	[X] *	
TCLP	[X] *	PCB	[X] *	
CEC	[ ]	COD	[ ]	

*If constituent is identified for delineation in the individual PSP.

6.B. Equipment Selection and SCQ Reference:

Equipment Selection		Refer to SCQ Section
ASL A		SCQ Section:
ASL B	X	SCQ Section: App. G Tables G-1&G-3
ASL C		SCQ Section:
ASL D	X	SCQ Section: App. G Tables G-1&G-3
ASL E	X (See sect. 7.3, pg. 6)	SCQ Section: App. G Tables G-1&G-3

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased [X] Composite [ ] Environmental [X] Grab [X] Grid [X]

Intrusive [X] Non-Intrusive [ ] Phased [ ] Source [ ]

DQO Number: SL-048, Rev. 5

7.B. Sample Work Plan Reference: This DQO is being written prior to the PSPs.

Background samples: OU5 RI

7.C. Sample Collection Reference:

Sample Collection Reference: SMPL-01, SMPL-02, EQT-06

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8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	[X]*	Container Blanks	[X]++
Field Blanks	[X]+	Duplicate Samples	[X]***
Equipment Rinsate Samples	[X]***	Split Samples	[X]**
Preservative Blanks	[ ]	Performance Evaluation Samples	[ ]
Other (specify)			

- * For volatile organics only
- ** Split samples will be collected where required by EPA or OEPA.
- *** If specified in PSP.
- \+ Collected at the discretion of the Project Manager (if warranted by field conditions)
- \+ + One per Area and Phase Area per container type (i.e. stainless steel core liner/plastic core liner/Geoprobe tube).

8.B. Laboratory Quality Control Samples:

Method Blank	[X]	Matrix Duplicate/Replicate	[X]
Matrix Spike	[X]	Surrogate Spikes	[ ]
Tracer Spike	[ ]		

Other (specify) Per SCQ

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

Control Number 2336

Fernald Environmental Management Project

Data Quality Objectives

Title: Real-Time Excavation Monitoring For Total Uranium Waste Acceptance Criteria (WAC)

Number: SL-055

Revision: 0

Final Draft: 6/8/99

Contact Name: Joan White

Approval: Joan White for James Chambers Date: 6/8/99
James E. Chambers
DQO Coordinator

Approval: Joan H White Date: 6/8/99
Joan White
Real-Time Instrumentation Measurement
Program Manager

Rev. #	0						
Effective Date:	6/8/99						

DATA QUALITY OBJECTIVES
Excavation Monitoring for Total Uranium Waste Acceptance Criteria (WAC)

<u>Members of Data Quality Objectives (DQO) Scoping Team</u>
The members of the scoping team included individuals with expertise in QA, analytical methods, field construction, statistics, laboratory analytical techniques, waste management, waste acceptance, data management, and excavation monitoring.

<u>Conceptual Model of the Site</u>
Fernald Environmental Management Project (FEMP) remediation includes the construction of an on-site disposal facility (OSDF) to be used for the safe permanent disposal of materials at or above the site final remediation levels (FRLs), but below the waste acceptance criteria (WAC) for constituents of concern (WAC COCs). The WAC concentrations for several constituents, including total uranium, were developed using fate and transport modeling, and were established to prevent a breakthrough of unacceptable levels of contamination (greater than a specified Maximum Contaminant Level to the underlying Great Miami Aquifer) over a 1000-year period of OSDF performance. The WAC for total uranium and other area-specific WAC COCs as referenced in the Operable Unit 5 (OU5) and Operable Unit 2 (OU2) Records Of Decision (RODs), the Waste Acceptance Plan for the On-Site Disposal Facility (WAC Plan), and the OSDF Impacted Materials Placement Plan (IMPP), must be achieved for all soil and soil-like materials that have been identified for disposal in the OSDF.

The extent of soil contamination requiring remediation was estimated and published in both the Operable Unit 5 and Operable Unit 2 Feasibility Studies (FS). These estimates were based on modeling analysis of available uranium data from soil samples collected during the Remedial Investigation (RI) efforts and from other environmental studies conducted at the FEMP. Maps outlining boundaries of soil contamination were generated for both the Operable Unit 5 and Operable Unit 2 FS documents by overlaying the results of the modeling analysis of uranium data with isoconcentration maps of other COCs. The soil contamination maps were further modified by conducting spatial analysis on the most current soil characterization data.

A sequential remediation plan has been presented which subdivides the FEMP into ten (10) independent remediation areas. Extensive historical sampling has demonstrated that in each of these 10 areas potentially above-WAC concentrations may not be present, may be limited to one WAC COC, or consist of a subset of WAC COCs. According to the Sitewide Excavation Plan (SEP) only WAC COCs with a demonstrated or likely presence in an area will be evaluated during remedial design and implementation. This DQO will be used to define the WAC decision-making process using excavation monitoring instrumentation in areas where soil and soil-like material is being excavated and total uranium is a WAC COC.

1.0 Statement of Problem

Adequate information must be available to demonstrate excavated soils or soil-like material is acceptable or unacceptable for disposal in the OSDF, based on the total uranium WAC.

Available Resources

Time: WAC decision-making information of sufficient quality must be made available to the Project Manager (or designee), characterization representative, and Waste Acceptance Operations representative (decision makers) prior to excavation and disposition of soil and soil-like materials.

Project Constraints: WAC decision-making information must be collected and assimilated with existing manpower and instrumentation to support the remediation schedule. Successful remediation of applicable areas, including excavation and placement of soil and soil-like material in the OSDF, is dependent on the performance of this work.

Summary of the Problem

Excavated soil or soil-like material must be classified as either of the following:

1. Having concentrations of total uranium at or above the WAC, and therefore, unacceptable for disposal in the OSDF, or
2. Having concentrations of total uranium below the WAC, and therefore, acceptable for disposal in the OSDF.

2.0 Identify the Decision

Decision

The WAC decision-making process will result in the classification of defined soil or soil-like material volumes as either meeting or exceeding the 1,030 ppm total uranium WAC.

Possible Results

1. A defined volume of soil or soil-like material has a concentration of total uranium at or above the WAC. This material is classified as unacceptable for placement in the OSDF, and will be identified, excavated, and segregated pending off-site disposition.

2. A defined volume of soil or soil-like material has a concentration of total uranium below the total uranium WAC. This soil is classified as acceptable for placement in the OSDF and is transported directly from the excavation to the OSDF for placement.

3.0 Identify Inputs That Affect the Decision

Required Information

The total uranium WAC published in the Waste Acceptance Criteria Attainment Plan for the OSDF, historical data, pre-design investigation data, and in-situ gamma spectrometry information collected prior to and during excavation are required to determine whether a specified volume of soil or soil-like material meets or exceeds the total uranium WAC.

Source of Informational Input

The list of sitewide OSDF WAC COCs identified in the OU2 and OU5 RODs and the WAC Plan will be referenced. Historical area specific data from the Sitewide Environmental Database (SED) will also be retrieved and evaluated for both radiological and chemical WAC constituents. This information will be utilized to determine area specific WAC COCs.

Non-invasive real-time excavation monitoring in areas where total uranium is a WAC concern will involve measurements collected with mobile and/or stationary in-situ gamma spectrometry equipment. These measurements will be collected from the surface of each excavation lift prior to excavation. Information compiled from this real-time monitoring will be assimilated and reviewed by decision makers to classify lifts or sections of lifts as either acceptable or unacceptable for placement in the OSDF. These measurements may also be collected on soils exposed after the removal of suspect above WAC material to verify its removal.

Action Levels

To ensure no above WAC soil or soil-like material is sent to the OSDF, threshold values (trigger levels) have been set for NaI and HPGe Phase 1 and II measurements. These values are significantly lower than the 1030 ppm total uranium OSDF not-to-exceed (NTE) level. The WAC Phase I (detection phase) threshold value is 721 ppm total uranium for NaI instruments (31 cm detector height), and 400 ppm total uranium for the HPGe (1 meter detector height). The WAC Phase II (confirmation and delineation phase) threshold value is 928 ppm total uranium for the HPGe (31 cm and 15 cm detector heights).

Methods of Data Collection

WAC Phase 1 measurements will be collected to obtain as close to complete coverage of the areas of concern as possible using either the NaI Radiation Measurement Systems (RMS) or HPGe equipment to identify potential above WAC total uranium locations. WAC Phase II measurements will be collected with strategically placed HPGe equipment to confirm and delineate Phase I potential above WAC measurements, as needed. The project may decide not to collect Phase II measurements if the potential above WAC area boundary is discernable by visual observation (such as presence of process residue or other OSDF prohibited items, discoloration of soil or soil-like material, or other information).

The project will use the real-time WAC Phase I and Phase II data as ASL A, and will perform no data validation (however the data will be collected with ASL B quality control criteria, for real-time project internal quality control. All measurements will be performed in compliance with operating procedures identified in Section 7.5 of this DQO, the Real-Time User's Manual, and the SEP.

4.0 The Boundaries of the Situation

Spatial Boundaries

Domain of the Decision: The boundaries where excavation monitoring for total uranium will be used is limited to soils and/or soil-like material in remediation areas where total uranium is a WAC COC, excavation is planned, and material is designated for disposition in the OSDF.

Population of Soils:

Includes all at-and below-grade soil and soil-like material impacted with total uranium potentially exceeding the WAC and planned for disposition in the OSDF.

Scale of Decision Making

Areas designated for excavation will be evaluated as to whether the soil or soil-like material is below or above the OSDF WAC for total uranium. Excavation monitoring will be conducted on each excavation lift. Based on the information obtained as a result of reviewing and modeling existing data coupled with newly acquired excavation monitoring information, a decision will be made whether an individual excavation lift, or portion of a lift, meets or exceeds the OSDF WAC for total uranium.

Temporal Boundaries

Time Constraint: Real-time excavation monitoring information must be acquired and processed in time for review and use in decision making prior to excavation and disposition of excavated material. The scheduling of WAC excavation monitoring is directly tied to the excavation schedule. WAC excavation monitoring will be performed and a disposition decision made prior to excavation of each designated lift. Acquired information must be processed and reviewed by the project decision-makers prior to disposition of the lift being monitored. Time limits to complete measurements are specified in the excavation subcontracts.

Practical Considerations: Weather, moisture, field conditions, and unforseen events affect the ability to perform excavation monitoring and meet the schedule. To maintain safe working conditions, excavation and construction activities will comply with all FEMP and project specific health and safety protocols.

5.0 Develop a Logic Statement

Parameter(s) of Interest

The parameter of interest is the concentration of total uranium in soil or soil-like material designated for disposition in the OSDF.

Waste Acceptance Criteria Concentration

The OSDF WAC concentration is 1,030 ppm for total uranium in soil and soil-like materials. This concentration is considered a NTE level for OSDF WAC attainment, and no real-time measurement data point, as defined by the instrument-specific threshold values, can meet or exceed this level in material destined for the OSDF.

Decision Rules

If excavation monitoring results are below the total uranium WAC for a specified volume of soil or soil like material, then that soil is considered acceptable for final disposition in the OSDF. If monitoring results reveal concentrations at or above the total uranium WAC, as indicated by exceeding the instrument-specific threshold level, then the unacceptable soil will be delineated, removed, and segregated pending off-site disposal.

6.0 Limits on Decision Errors

Range of Parameter Limits

The area-specific total uranium soil concentrations anticipated in excavation areas will range from background levels (naturally-occurring soil concentrations) to concentrations greater than the total uranium WAC levels.

Types of Decision Errors and Consequences

Decision Error 1: This decision error occurs when the decision makers decide a specified volume of soil or soil-like material is below the WAC for total uranium, when in fact the uranium concentration in that soil is at or above the WAC. This error would result in soil or soil like material with concentrations above the WAC for total uranium being placed into the OSDF. Since the WAC is a NTE level, this error is unacceptable.

Decision Error 2: This decision error occurs when a volume of soil or soil-like material is identified as above WAC, excavated, and sent for off-site disposition when the material is actually below the WAC for total uranium. This error would result in added costs due to the unnecessary segregation and off-site disposition of material that is acceptable for disposal in the OSDF.

True State of Nature for the Decision Errors

The true state of nature for Decision Error 1 is that the actual concentration of total uranium in a volume of soil or soil-like material is greater than the WAC. The true state of nature for Decision Error 2 is that the actual concentration of total uranium in a volume of soil or soil-like material is below the WAC. Decision Error 1 is the more severe error.

7.0 Design for Obtaining Quality Data

7.1 WAC Attainment Excavation Monitoring

WAC attainment will be based on real-time excavation monitoring using the NaI and

HPGe measurement systems. Phase I (detection phase) measurements are collected with the NaI systems using a spectral acquisition time of 4 seconds, at a detector speed of 1 mile per hour (mph), and a detector height of 31 cm. These parameters achieve the required sensitivity, and are the best compromise of practical considerations such as detector speed and time in the field. In the NaI systems, the presence of thorium contamination can cause interferences which could affect total uranium concentration calculations. Uranium results associated with thorium values greater than 500 net counts per second will be reevaluated. The threshold value (trigger level) for Phase I NaI measurements is 721 ppm for total uranium (70% of the 1,030 ppm WAC concentration for soil, arrived at by agreement with the USEPA). Phase I measurements can also be collected with the HPGe systems using a spectral acquisition time of 5 minutes, and a detector height of 1 meter (the threshold value is lower than the NaI threshold value because of the larger field of view at the HPGe 1 meter detector height). (For more information reference the *RTRAK Applicability Study, 20701-RP-0003, Revision 1, May 1998).*

At the discretion of the characterization lead, Phase II confirmation and delineation measurements may be collected using the HPGe systems with a spectral acquisition time of 5 minutes at both the 31 cm and 15 cm detector heights. The HPGe detector will be placed directly over the zone of maximum activity identified by the Phase I measurements. The threshold value (trigger level) for Phase II measurements is 928 ppm for total uranium at either detector height. Lower (more conservative) threshold values may be defined in the PSP. (For more information reference the *User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site, 20701-RP-0006, Revision A, May 8, 1998.*)

In the event the monitoring data exceeds the trigger levels (see above), the entire vertical thickness (3 ± 1 foot) of the areal extent of above-WAC material will be removed and segregated pending off-site disposal.

7.2 Interpretation of Results

The results obtained from real-time monitoring for purposes of WAC attainment will be compared to the published OSDF WAC concentration for total uranium. If results are equal to or greater than the WAC concentration (as defined by exceeding the specific threshold value level), the decision makers may take one of the following actions:

- Determine that the entire unit volume or "lift" subjected to excavation monitoring is at or above WAC and requires segregation pending off-site disposal.

- Based on adequacy of existing information (including visual inspection), excavate and segregate the portion of the lift material that is at or above WAC pending off-site disposition.

- Perform additional real-time monitoring to more accurately delineate the areal extent of above-WAC contamination. Using this information, define the extent of removal efforts to be conducted.

7.3 QC Considerations

The following data management requirements will be met prior to evaluation of acquired WAC attainment information:

1) An excavation monitoring form will be completed and reviewed in the field.

2) WAC data and decision-making information will be assigned to respective soil profiles, so characterization and tracking information can be maintained and retrieved.

3) The mobile sodium iodide systems will generate ASL level A data, with no data validation. The HPGe detectors are capable of providing either ASL level A or B data, however for WAC determination only ASL A data will be generated.

4) When using the HPGe detectors, duplicate measurements will be taken at a frequency of one in twenty measurements or one per excavation lift, whichever is greater.

7.4 Independent Assessment

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances. Surveillances shall be planned and documented in accordance with Section 12.3 of the SCQ.

7.5 Applicable Procedures

Real-time monitoring performed under the PSP shall follow the requirements outlined within the following procedures:

- ADM-16, In-Situ Gamma Spectrometry Quality Control Measurements
- EQT-22, High Purity Germanium Detector In-Situ Efficiency Calibration
- EQT-23, Operation of ADCAM Series Analyzers with Gamma Sensitive Detectors
- EQT-32, Troxler 3440 Series Surface Moisture/Density Gauge

- EQT-33, Real Time Differential Global Positioning System
- EQT-39, Zeltex Infrared Moisture Meter
- EQT-40, Satloc Real-time Differential Global PositioningSystem
- EQT-41, Radiation Measurement Systems
- 20300-PL-002, Real Time Instrumentation Measurement Program Quality Assurance Plan
- EW-1022, On-Site Tracking and Manifesting of Bulk Impacted Material

7.6 References

- Sitewide CERCLA Quality Assurance Project Plan (SCQ), May 1995, FD-1000
- Sitewide Excavation Plan, July 1998, 2500-WP-0028, Revision 0
- Waste Acceptance Criteria Attainment Plan for the On-Site Disposal Facility, June 1998, 20100-PL-0014, Revision 0
- Impacted Materials Placement Plan for the On-Site Disposal Facility, January 1998, 20100-PL-007, Revision 0
- Area 2, Phase 1 Southern Waste Units Implementation Plan for Operational Unit 2, July 1998, 2502-WP-0029, Revision 0
- RTRAK Applicability Study, May 1998, 20701-RP-0003, Revision 1
- User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site, July 1998, 20701-RP-0006 Revision B

Data Quality Objectives
Excavation Monitoring for Total Uranium Waste Acceptance Criteria (WAC)

1A. Task/Description: Waste Acceptance Criteria Monitoring

1.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☐ RA ☒ R_vA ☐ OTHER

1.C. DQO No.: SL-055 DQO Reference No.: N/A

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2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☐ Sediment ☐

Soil and Soil Like Material ☒

Waste ☐ Wastewater ☐ Surface water ☐ Other (specify) ________

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3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization
A ☐ B ☐ C ☐ D ☐ E ☐

Risk Assessment
A ☐ B ☐ C ☐ D ☐ E ☐

Evaluation of Alternatives
A ☐ B ☐ C ☐ D ☐ E ☐

Engineering Design
A ☐ B ☐ C ☐ D ☐ E ☐

Monitoring during remediation activities
A ☐ B ☐ C ☐ D ☐ E ☐

Other Waste Acceptance Evaluation
A ☒ B ☐ C ☐ D ☐ E ☐

4.A. Drivers: Specific construction work plans, Applicable or Relevant and Appropriate Requirements (ARARs) and Operable Unit 2 and Operable Unit 5 Records of Decision (ROD).

4.B. Objective: To provide data for identification of soils and soil-like materials for compliance with Waste Acceptance Criteria.

5. Site Information (Description):

The RODs specify that FEMP soils will be below the WAC for disposal in the OSDF. WAC determination will be necessary for site soils and soil like material that is scheduled for excavation and potential OSDF disposition.

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH ☐
   Temperature ☐
   Specific Conductance ☐
   Dissolved Oxygen ☐
   Technetium-99 ☐

2. Uranium ☒
   Full Radiological ☐
   Metals ☐
   Cyanide ☐
   Silica ☐

3. BTX ☐
   TPH ☐
   Oil/Grease ☐

4. Cations ☐
   Anions ☐
   TOC ☐
   TCLP ☐
   CEC ☐
   COD ☐

5. VOA ☐
   BNA ☐
   Pesticides ☐
   PCB ☐

6. Other (specify) ☒
   Moisture

6.B. Equipment Selection and SCQ Reference:

ASL A Nal and HPGe SCQ Section: Appendix H

ASL B ______ SCQ Section: ______

ASL C ______ SCQ Section: ______

ASL D ______ SCQ Section: ______

ASL E ______ SCQ Section: ______

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased	☐	Composite	☐	Environmental	☐	Grab	☐	Grid	☐
Intrusive	☐	Non-Intrusive	☒	Phased	☐	Source	☐		

DQO Number: SL-055

7.B. Sample Work Plan Reference: The DQO is being established prior to completion of the PSP.

Background samples: SED

8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	☐	Container Blanks	☐
Field Blanks	☐	Duplicate Measurements	☒*
Equipment Rinsate Samples	☐	Split Samples	☐
Preservative Blanks	☐	Performance Evaluation Samples	☐

Other (specify) ____________

*For the HPGe detectors, duplicate measurements will be made every 1 in 20 or one per lift, whichever is greater.

8.B. Laboratory Quality Control Samples:

Method Blank	☐	Matrix Duplicate/Replicate	☐
Matrix Spike	☐	Surrogate Spikes	☐

Other (specify) Per method

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

APPENDIX C

SOIL SAMPLES TO BE COLLECTED FOR THE AREA 3A/4A SURFACE PREDESIGN INVESTIGATION

APPENDIX C
SOIL SAMPLES TO BE COLLECTED FOR THE AREA 3A/4A SURFACE PREDESIGN INVESTIGATION

Location	Northing	Easting	Depth	Sample ID	Analysis	Analytes
1	482071.38	1349489.52	0'-0.5'	3A4A-1-1-S	TAL A	4-nitroaniline
			0'-0.5'	3A4A-1-1-AB		Alpha/Beta Screen
2	482078.00	1349489.09	0'-0.5'	3A4A-2-1-S	TAL A	4-nitroaniline
			0'-0.5'	3A4A-2-1-AB		Alpha/Beta Screen
3	482071.28	1349496.28	0'-0.5'	3A4A-3-1-S	TAL A	4-nitroaniline
			0'-0.5'	3A4A-3-1-AB		Alpha/Beta Screen
4	482065.16	1349488.71	0'-0.5'	3A4A-4-1-S	TAL A	4-nitroaniline
			0'-0.5'	3A4A-4-1-AB		Alpha/Beta Screen
5	482071.53	1349481.61	0'-0.5'	3A4A-5-1-S	TAL A	4-nitroaniline
			0'-0.5'	3A4A-5-1-AB		Alpha/Beta Screen
6	481396.89	1349597.39	0'-0.5'	3A4A-6-1-S	TAL B	bis(2-chloroisopropyl)ether
			0'-0.5'	3A4A-6-1-AB		Alpha/Beta Screen
7	481408.13	1349597.11	0'-0.5'	3A4A-7-1-S	TAL B	bis(2-chloroisopropyl)ether
			0'-0.5'	3A4A-7-1-AB		Alpha/Beta Screen
8	481396.80	1349608.97	0'-0.5'	3A4A-8-1-S	TAL B	bis(2-chloroisopropyl)ether
			0'-0.5'	3A4A-8-1-AB		Alpha/Beta Screen
9	481386.06	1349596.25	0'-0.5'	3A4A-9-1-S	TAL B	bis(2-chloroisopropyl)ether
			0'-0.5'	3A4A-9-1-AB		Alpha/Beta Screen
10	481396.53	1349596.03	0'-0.5'	3A4A-10-1-S	TAL B	bis(2-chloroisopropyl)ether
			0'-0.5'	3A4A-10-1-AB		Alpha/Beta Screen
11	480715.68	1349606.40	0'-0.5'	3A4A-11-1-R	TAL C	Total uranium
			1.0'-1.5'	3A4A-11-3-V		Archive
			2.0'-2.5'	3A4A-11-5-V		Archive
			3.0'-3.5'	3A4A-11-7-V		Archive

APPENDIX C
SOIL SAMPLES TO BE COLLECTED FOR THE AREA 3A/4A SURFACE PREDESIGN INVESTIGATION
(continued)

Location	Northing	Easting	Depth	Sample ID	Analysis	Analytes
12	480780.56	1349658.63	0'-0.5'	3A4A-12-1-R	TAL C	Total uranium
			1.0'-1.5'	3A4A-12-3-V		Archive
			2.0'-2.5'	3A4A-12-5-V		Archive
			3.0'-3.5'	3A4A-12-7-V		Archive
13	480776.23	1349757.77	0'-0.5'	3A4A-13-1-R	TAL C	Total uranium
			1.0'-1.5'	3A4A-13-3-V		Archive
			2.0'-2.5'	3A4A-13-5-V		Archive
			3.0'-3.5'	3A4A-13-7-V		Archive

APPENDIX D

TARGET ANALYTE LIST

APPENDIX D
TARGET ANALYTE LIST

TAL 20200-PSP-0004-A

Soil Analysis - Total SVOCs		
1	ASL B	4-Nitroaniline

TAL 20200-PSP-0004-B

Soil Analysis - Total SVOCs		
1	ASL B	Bis(2-chloroisopropyl)ether

TAL 20200-PSP-0004-C

Soil Analysis - ICP/MS		
1	ASL B	Total Uranium